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National Marine Fisheries Service

Indexed Bibliography of the Eggs and Young of Tunas and Other Scombrids (Pisces, Scombridae), 1880-1970

WILLIAM J. RICHARDS and WITOLD L. KLAWE

SEATTLE, WA
September 1972

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612. The Trade Wind Zone Oceanography Pilot Study. Part VIII: Sea-level meteorological properties and heat exchange processes, July 1963 to June 1965. By Gunter R. Seckel. June 1970, iv + 129 pp., 6 figs., 8 tables.

613. Sea-bottom photographs and macrobenthos collections from the Continental Shelf off Massachusetts. By Roland L. Wigley and Roger B. Theroux. August 1970, iii + 12 pp., 8 figs., 2 tables.

614. A sled-mounted suction sampler for benthic organisms. By Donald M. Allen and J. Harold Hudson. August 1970, iii + 5 pp., 5 figs., 1 table.

615. Distribution of fishing effort and catches of skipjack tuna, *Katsuwonus pelamis*, in Hawaiian waters, by quarters of the year, 1948-65. By Richard N. Uchida. June 1970, iv + 37 pp., 6 figs., 22 tables.

616. Effect of quality of the spawning bed on growth and development of pink salmon embryos and alevins. By Ralph A. Wells and William J. McNeil. August 1970, iii + 6 pp., 4 tables.

617. Fur seal investigations, 1968. By NMFS, Marine Mammal Biological Laboratory. December 1970, iii + 69 pp., 68 tables.

618. Spawning areas and abundance of steelhead trout and coho, sockeye, and chum salmon in the Columbia River Basin - past and present. By Leonard A. Fulton. December 1970, iii + 37 pp., 6 figs., 11 maps, 9 tables.

619. Macrozooplankton and small nekton in the coastal waters off Vancouver Island (Canada) and Washington, spring and fall of 1963. By Donald S. Day, January 1971, iii + 94 pp., 19 figs., 13 tables.

620. The Trade Wind Zone Oceanography Pilot Study. Part IX: The sea-level wind field and wind stress values, July 1963 to June 1965. By Gunter R. Seckel. June 1970, iii + 66 pp., 5 figs.

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U.S. DEPARTMENT OF COMMERCE
Peter G. Peterson, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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NATIONAL MARINE FISHERIES SERVICE
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NOAA Technical Report NMFS SSRF-652

Indexed Bibliography of the Eggs and Young of Tunas and Other Scombrids (Pisces, Scombridae), 1880-1970

WILLIAM J. RICHARDS and WITOLD L. KLAWE

BIBLIOGRAFIA CATALOGADA DE LOS HUEVOS Y ATUNES JOVENES Y DE OTROS ESCOMBRIDOS (PISCES, SCOMBRIDAE), 1880-1970

INDEX BIBLIOGRAPHIQUE SUR LES OEUFS ET FORMES JUVENILES DES THONS ET AUTRES POISSONS DE LA FAMILLE DES SCOMBRIDAE (PISCES, SCOMBRIDAE), 1880-1970

EIN BIBLIOGRAPHISCHES VERZEICHNIS DER ARBEITEN ÜBER DIE EIER UND JUGENDSTADIEN VON THUNFISCHEN UND ANDEREN SCOMBRIDEN (PISCES, SCOMBRIDAE), 1880-1970

SEATTLE, WA
September 1972

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Indexed Bibliography of the Eggs and Young of Tunas and Other Scombrids (Pisces, Scombridae), 1880-1970.[1]

by

WILLIAM J. RICHARDS[2] and WITOLD L. KLAWE[3]

ABSTRACT

This bibliography enumerates reports on the early life history of tunas and other scombrid fishes published before 1971. All the entries are indexed, usually by species, but on occasion by a larger taxonomic unit, and within each taxonomic unit the entries are indexed by one or more subjects.

INTRODUCTION

This bibliography is a compilation of references on the early life history of scombrid fishes, particularly tunas, designed to facilitate the retrieval of printed information on the subject, particularly the (i) identification of eggs, larvae, and juveniles, (ii) methods of collection of early life stages, (iii) distribution and abundance, and (iv) ecology and general biology of all these stages. As our compilation of the bibliographical entries terminated in December of 1970 it is assumed that most publications printed through 1970 are included in this bibliography. Since our bibliography is restricted to reports pertaining to fertilized eggs, larvae, and juveniles, references dealing exclusively with gonad studies, i.e., ovarian eggs (ova), are excluded from this report. We attempted to cover all the entries pertaining to early life history of all species in the family Scombridae, and we believe that all major works are enumerated in our report. However, in the case of the mackerels of the genus *Scomber*, we limited the entries to what we believe are the more significant reports on this genus. Because of the vastness of the printed material on *Scomber* spp. and our own lack of experience with the genus, we feel that compilation of bibliographical entries pertaining to the early life history of *Scomber* spp. should be left to an expert in that field.

Tunas are a world resource because of their far-ranging migratory habits and because most of them are harvested at high seas by fleets of many nations. Research on tunas further reflects these international aspects, being carried out by scientists from many countries or even from international organizations. We feel, therefore, that it is most appropriate to employ in our bibliography four languages, thus making the publication more accessible to our colleagues from around the world.

INDEXING SYSTEM

This bibliography is divided into three parts. Entries are listed alphabetically by author and chronologically for each author. We have followed the guidelines of Brown and Stratton

[1] Contribution No. 199, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Center, Miami Laboratory, Miami, Florida 33149.

[2] National Marine Fisheries Service, Southeast Fisheries Center, Miami Laboratory, Miami, Florida 33149.

[3] Inter-American Tropical Tuna Commission, Scripps Institution of Oceanography, La Jolla, California 92037.

(1964) and Porter (1968) in listings and abbreviations of the titles of journals. In addition, all junior authors are listed alphabetically with references to their respective papers. To further assist readers in finding cited publications, the second part lists abbreviations and full titles of periodicals.

The subject index comprises the third part of the bibliography. This index is arranged alphabetically by taxa; within each taxon there are three subdivisions—(i) eggs, (ii) larvae, and (iii) juveniles. Each subdivision has four parts—(i) description, (ii) distribution, (iii) collection methods, and (iv) general biology. The description portion includes papers which describe the morphology of the animal; the distribution section includes papers which describe geographic distribution and abundance; the collection method section includes papers which describe methods; and the general biology portion includes papers which discuss biological aspects not covered in the previous sections, i.e., growth, behavior, culture, temperature and salinity tolerances, diurnal movements, etc. Where no references were found it is noted as "no references found."

The taxa employed in the index conform with the most recent systematic reviews available. The systematic reviews which we followed were: Fraser-Brunner (1950); Collette and Gibbs (1963); Gibbs and Collette (1967); and Matsui (1967). The genera and species of the family Scombridae together with the geographical distribution of each of the species are listed in Table 1. For the purpose of indexing, each bibliographical entry was classified according to its respective species whenever feasible. When this was not possible the next highest taxon was used. In the subject index, taxa such as Thunnidae and Katsuwonidae appear because several papers use these taxa and thus they remain convenient for our purposes.

Bibliografía Catalogada de los Huevos y Atunes Jóvenes y de Otros Escombridos (Pisces, Scombridae), 1880-1970[1]

por

WILLIAM J. RICHARDS[2] y WITOLD L. KLAWE[3]

EXTRACTO

Esta bibliografía presenta los trabajos publicados con anterioridad a 1971, de los primeros estadios del ciclo vital de los atunes y de otros peces escómbridos. Todas las anotaciones han sido catalogadas, generalmente por especies, pero en ocasiones mediante una unidad taxonómica mayor, y dentro de cada unidad taxonómica se encuentran las anotaciones indicadas por uno o más sujetos.

INTRODUCCION

Esta bibliografía es una compilación de referencias sobre los primeros estadios del ciclo vital de los peces escómbridos, especialmente los atunes; concebida para poder recobrar la información publicada sobre este sujeto, especialmente (i) la identificación de los huevos, larvas y juveniles, (ii) métodos de recolección de los primeros estadios del ciclo vital, (iii) distribución, abundacia, (iv) ecología y biología general de todas estas fases. Como la compilación de estas anotaciones bibliográficas fue terminada en diciembre 1970, se considera que la mayoría de las publicaciones impresas hasta esa fecha se encuentran incluidas en esta bibliografía. En vista de que nuestra bibliografía se encuentra limitada a informes referentes a huevos fertilizados, larvas y juveniles, las referencias que tratan exclusivamente de los estudios de las gónadas, es decir, óvulos, se excluyen en este informe. Hemos intentado abarcar todas las anotaciones referentes a los primeros estadios del ciclo vital de todas las especies de la familia Scombridae y, creemos, que se han enumerado todos los trabajos principales en nuestro informe. Sin embargo, en el caso de las caballas del género *Scomber*, limitamos las anotaciones a lo que creemos son los informes más representativos en este género. A causa de la gran cantidad de material impreso en *Scomber* spp. y a nuestra propia falta de experiencia con este género, nos parece que la compilación de anotaciones bibliográficas referentes a los primeros estadios del ciclo vital de *Scomber* spp. debe encomendarse a un experto en este ramo.

Los atunes son un recurso mundial debido a sus hábitos migratorios a grandes distancias, y a causa de que la mayoría de ellos son capturados en alta mar por las flotas de muchas naciones. La investigación sobre los atunes refleja aún más estos aspectos internacionales, siendo realizada por científicos de varios países o aún por organizaciones internacionales. Creemos, por lo tanto, que lo más apropiado es emplear cuatro idiomas en nuestra bibliografía, facilitando así para que la publicación

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[3] Comisión Interamericana del Atún Tropical, Scripps Institution of Oceanography, La Jolla, California 92037.

sea más accessible a nuestros colegas en todo el mundo.

SISTEMA CATALOGADOR

Esta bibliografía está dividida en tres partes. Las anotaciones se encuentran enumeradas alfabéticamente por autor y cronológicamente por cada autor. Hemos seguido las normas de Brown y Stratton (1964) y Porter (1968) en la enumeración y en la abreviatura de los títulos de las publicaciones científicas. Además, todos los autores secundarios se encuentran enumerados alfabéticamente con referencia a sus respectivos trabajos. Con el fin de ayudar a los lectores a encontrar las publicaciones citadas, en la segunda parte se enumeran las abreviaturas y títulos completos de los artículos que se encuentran en las revistas científicas.

La tabla de materias forma la tercera parte de la bibliografía. El índice está arreglado alfabéticamente por taxones; cada taxon tiene tres subdivisiones—(i) huevos, (ii) larvas, e (iii) juveniles. Cada una de estas subdivisiones tiene cuatro partes—(i) descripción, (ii) distribución, (iii) métodos de recolección y (iv) biología general. La parte descriptiva incluye artículos que describen la morfología del animal; la sección de distribución comprende artículos que describen la distribución geográfica y abundancia; la sección de los métodos de recolección contiene disertaciones en las que se discriben los métodos; y la parte de la biología general comprende estudios en los que se discuten los aspectos biológicos que no se encuentran incluidos en secciones anteriores, es decir, crecimiento, comportamiento, cultura, tolerancia a la temperatura y salinidad, movimientos diurnos, etc. Se anotó "no references found" donde no se encontraron referencias.

Los taxones empleados en el índice están de acuerdo a las revisiones sistemáticas utilizadas recientemente. Las revisiones sistemáticas adoptadas fueron: Fraser-Brunner (1950); Collette y Gibbs (1963); Gibbs y Collette (1967) y Matsui (1967). Los géneros y especies de la familia Scombridae, junto con la distribución geográfica de cada una de ellas, se enumeran en la Tabla 1. Cuantas veces fue posible, cada entrada bibliográfica fue catalogada para su clasificación de acuerdo a su respectiva especie. Cuando no lo fue, se empleó el taxon mayor que le seguía. En la tabla de materias, aparecen tales taxones como Thunnidae y Katsuwonidae, ya que varios estudios los han empleado y, por lo tanto, son convenientes para nuestros fines.

Index Bibliographique sur les Oeufs et Formes Juveniles des Thons et Autres Poissons de la Famille des Scombridae (Pisces, Scombridae) 1880-1970[1]

par

WILLIAM J. RICHARDS et WITOLD L. KLAWE[2]

SOMMAIRE

Cette bibliographie énumère les publications qui ont été publiées avant l'année 1971 sur la vie larvaire des thons et autres poissons de la famille des scombridae. Tous les travaux enregistrés figurent à l'index, généralement au niveau de l'espèce, mais parfois au niveau d'une unité taxonomique plus élevée; à l'intérieur de chaque unité taxonomique, les travaux figurent à l'index par thèmes séparés ou groupés.

INTRODUCTION

Cette bibliographie groupe les travaux de références sur la vie larvaire des poissons de la famille des scombridae, en particulier des thons. Elle est destinée à faciliter la recherche des informations, spécialement sur (i) l'identifications des oeufs, larves et juvéniles, (ii) les méthodes de récolte des stades larvaires, (iii) la distribution, l'abondance, (iv) l'écologie et la biologie des scombridés à ces différents stades. Ce travail ayant été terminé en décembre 1970, nous supposons que la plupart des publications parues en 1970 y sont inclues. Comme nous nous sommes limités à l'étude des oeufs fécondés, larves et juvéniles, les travaux concernant exclusivement les études sur les gonades, [c.à.d. les oeufs ovariens, (ova)], ne paraissent pas dans cet ouvrage bibliographique. Nous avons tenté d'englober tous les sujets se rapportant à la vie larvaires de toutes les espèces de la famille des scombridae et nous pensons avoir donné ici un énumération des principaux travaux. Cependant, en ce qui concerne les maquereaux du genre *Scomber*, nous nous sommes limités aux publications qui nous on paru être les plus importantes sur ce genre. En raison de l'ampleur de la documentation sur *Scomber* spp. et de notre manque d'expérience concernant ce genre particulier, il nous semble qu'une bibliographie relative à la vie larvaire de *Scomber* spp. devrait être laissée aux soins d'un expert en la matière.

Les thons sont une ressource mondiale en raison de l'amplitude de leurs migrations et du fait qu'ils sont pour la plupart pêchés en haute mer, par les flottes de nombreuses nations. Les recherches sur les thons reflètent également ces aspects internationaux, car elles sont poursuivies par des chercheurs appartenant à beaucoup de pays ou même à des organisations internationales. Nous pensons donc qu'il y a lieu

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d'employer quatre langues dans notre bibliographie, de manière à en faciliter l'accès à nos collègues des diverses parties du monde.

PRESENTATION DE L'INDEX BIBLIOGRAPHIQUE

Cette bibliographie est divisée en trois parties. Les travaux sont d'abord présentés dans l'ordre alphabétique des auteurs et dans l'ordre chronologique pour chaque auteur. Nous nous sommes conformés aux règles de Brown et Stratton (1964) et de Porter (1968) pour la présentation et les abréviations des titres de revues. De plus, tous les auteurs récents sont énumérés dans l'ordre alphabétique avec les références de leurs travaux respectifs. Afin d'apporter aux lecteurs une aide supplémentaire dans la recherche des publications citées, la seconde partie donne une liste des titres complets des périodiques et de leurs abréviations.

La troisième partie de la bibliographie est une table des matières. Elle est agencée alphabétiquement par taxa; il y a trois subdivisions pour chaque taxon—(i) oeufs, (ii) larves et (iii) juvéniles. Chaque subdivision comporte quatre parties—(i) description, (ii) distribution, (iii) méthodes de récolte et (iv) biologie générale. La partie "description" comprend les travaux décrivant la morphologie de l'animal; la partie "distribution" concerne les travaux sur la distribution géographique et l'abondance; la partie "méthodes de récolte" inclus les travaux qui décrivient les techniques de capture; enfin la partie "biologie générale" comprend les travaux traitant les aspects biologiques non compris dans les sections précédentes, c.à.d. croissance, comportement, culture, tolérances à la température et à la salinité, déplacements diurnes, etc. . . Lorsqu'aucune référence n'a pu être trouvée, ceci est indiqué par la mention "no references found".

Les taxa utilisés dans l'index sont conformes aux plus récentes revues de systématique disponibles. Les revues de systématique sur lesquelles nous nous sommes basés sont de Fraser-Brunner (1950), Collette et Gibbs (1963), Gibbs et Collette (1967) et Matsui (1967). Les genres et espèces de la famille des scombridae ainsi que la distribution géographique de chacune des espèces sont énoncés dans le Tableau 1. Pour suivre l'index, chaque référence bibliographique a été classée selon l'espèce respective toutes les fois que cela a été possible. Lorsque ceci n'a pu être réalisé, le taxon immédiatement supérieur a été utilisé. Dans la table de matières, apparaissent des taxa tels que Thunnidae et Katsuwonidae. Cette séparation faite par de nombraux auteurs semble donc logique dans ce travail.

Ein Bibliographisches Verzeichnis der Arbeiten über die Eier und Jugendstadien von Thunfischen und anderen Scombriden (Pisces, Scombridae), 1880-1970.[1]

von

WILLIAM J. RICHARDS[2] und WITOLD L. KLAWE[3]

KURZFASSUNG

Die Berichte, die in der Bibliographie verzeichnet sind, behandeln die Jugendstadien der Thunfische und anderer Scombriden und sind vor 1971 veröffentlicht worden. Die meisten Eintragungen sind nach den Arten verzeichnet, manchmal jedoch wurden höhere taxonomische Einheiten zum katalogisieren benützt. Die Eintragungen innerhalb jeder taxonomischen Einheit sind dann wiederum nach einem oder mehreren Gegenständen verzeichnet.

EINLEITUNG

Die Bibliographie führt eine Ansammlung von Arbeiten an, die die Jugendstadien von Scombriden, insbesondere von Thunfischen, behandelt. Zweck der Bibliographie ist es, das Auffinden von gedruckter Kenntnis des Gegenstandes zu ermöglichen, insbesondere die (I) Feststellung der Eier, Larven und Jugendstadien, (II) Fangmethoden von Larven und Jugendstadien, (III) Verbreitung und Häufigkeit des Vorkommens und (IV) Ökologie und allgemeine Biologie dieser Lebensstadien. Die Ansammlung des bibliographischen Materials endete im Dezember 1970. Wir nehmen an, dass fast alle Werke, die bis zum Ende von 1970 gedruckt worden sind, hier in dieser Bibliographie eingetragen sind. Werke, die ausschliesslich Gonaden behandeln, d.h. Eier der Ovarien, sind in diese Bibliographie nicht mit einbezogen worden, da wir uns auf Werke beschränkt haben die befruchtete Eier, Larven und Jugendstadien behandeln. Wir haben versucht, alle Veröffentlichungen, die die frühen Lebensstadien aller Arten der Familie Scombridae betreffen, einzuschliessen, und wir glauben, dass alle hauptsächlichen Arbeiten in unserer Bibliographie verzeichnet sind. Wir beschränkten uns jedoch bei der Aufführung der Makrelen der Gattung *Scomber* auf die Eintragung der wichtigeren Hauptwerke, weil wir nur wenig Erfahrung mit dieser Gattung haben und weil das gedruckte Material über *Scomber* spp. zu umfangreich ist. Nach unserer Meinung sollte nur ein Fachmann auf dem Gebiet der Jugendstadien von *Scomber* spp. die Zusammentragung des bibliographischen Materiales übernehmen.

Thunfische sind eine Weltnahrungsquelle wegen ihrer weitreichenden Wanderungsgewohnheiten und auch weil die meisten Arten

[1] Beitrag Nummer: 199, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Center, Miami Laboratory, Miami, Florida 33149.

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[3] Inter-American Tropical Tuna Commission, Scripps Institution of Oceanography, La Jolla, California 92037.

auf Hochsee von Flotten vieler Nationen eingebracht werden. Thunfischforschung reflektiert auch diese internationalen Aspekte, da sie von Forschern vieler Länder, und sogar von internationalen Organisationen ausgeführt wird. Wir halten es daher für angebracht in unserer Bibliographie vier Sprachen anzuwenden um unseren Kollegen in der ganzen Welt die Zugänglichkeit der Publikation zu erleichtern.

VERZEICHNUNGSSYSTEM

Die Bibliographie besteht aus drei Teilen. Die Eintragungen wurden alphabetisch nach dem Verfasser verzeichnet und sind dann für jeden Verfasser zeitlich geordnet. Wir folgten den Richtlinien von Brown und Stratton (1964) und Porter (1968) zum Verzeichnen und Abkürzen der Namen von Zeitschriften. Alle Mitverfasser sind zusätzlich alphabetisch mit ihren Arbeiten angeordnet. Um dem Leser noch weiterhin behilflich zu sein, zitierte Veröffentlichungen zu finden, sind im zweiten Teil die Abkürzungen und die unabgekürzten Namen der Zeitschriften verzeichnet.

Das Sachverzeichnis umfasst den dritten Teil der Bibliographie. Es ist alphabetisch nach den Taxa angelegt. Unter jedem Taxon sind dann drei Unterteilungen—(I) Eier, (II) Larven, (III) Jugendstadien. Jede der drei Unterteilungen hat dann vier Teile—(I) Beschreibung, (II) Verbreitung, (III) Fangmethoden und (IV) allgemeine Biologie. Der Teil unter "Beschreibung" enthält die Arbeiten, die die Morphologie des Tieres beschreiben; der Teil unter "Verbreitung" enthält die Arbeiten, die die geographische Verbreitung und Häufigkeit des Vorkommens behandeln. Der "Fangmethoden" Teil enthält Arbeiten, in denen die Methoden des Fanges beschrieben werden; in dem Teil "allgemeine Biologie" sind die Arbeiten enthalten, die die biologischen Aspekte behandeln, die in den vorhergehenden Teilen nicht erwähnt wurden, wie zum Beispiel Wachstum, Tierpsychologie, Fischkultur, Temperatur und Salzgehalt Toleranzen, tägliche Standortveränderungen u.s.w. Wo Referenzen nicht vorhanden waren, wurde es als "no references found" notiert.

Die Taxa im Sachverzeichnis entsprechen den neuesten anliegenden systematischen Arbeiten. Wir richteten uns nach den folgenden systematischen Arbeiten: Fraser-Brunner (1950), Collette und Gibbs (1963), Gibbs und Collette (1967) und Matsui (1967). Die Gattungen und Arten der Familie Scombridae sind zusammen mit der geographischen Verteilung der Arten in Tabelle 1 aufgeführt. Nach Möglichkeit wurden die bibliographischen Angaben nach den jeweiligen betrefflichen Arten gemacht. Wenn dies jedoch nicht möglich war, wurde das nächsthöhere Taxon verwendet. Die Taxa Thunnidae und Katsuwonidae treten im Sachverzeichnis auf, weil sie in mehreren Arbeiten vorkommen.

TABLE 1. List of genera and species of the family Scombridae and the geographical distribution of each species.*

TABLA 1. Lista de géneros y especies de la familia Scombridae y de la distribución geográfica de cada especie.*

TABLEAU 1. Liste des genres et espèces de la famille des Scombridae et distribution géographique de chaque espèce.*

TABELLE 1. Eine Liste der Gattungen und Arten der Familie Scombridae und die geographische Verteilung jeder Art.*

ACANTHOCYBIUM Gill, 1862

Acanthocybium solandri (Cuvier *in* Cuvier and Valenciennes, 1831)

Tropical and subtropical waters of the Indo-Pacific and Atlantic Oceans including the Mediterranean Sea.

Aguas tropicales y subtropicales de los océanos Indico, Pacífico y Atlántico, incluyendo el Mar Mediterráneo.

Eaux tropicales et subtropicales des Océans Indien, Pacifique et Atlantique, y compris la Mer Méditerranée.

Tropische und subtropische Gewässer des Indischen, Pazifischen und Atlantischen Ozeans einschliesslich des Mittelmeeres.

ALLOTHUNNUS Serventy, 1948

Allothunnus fallai Serventy, 1948

Southern regions of the Indo-Pacific and Atlantic oceans; sporadic in the eastern Pacific Ocean.

Regiones meridionales de los océanos Indico, Pacífico y Atlántico; esporádicamente en el Océano Pacífico oriental.

Régions méridionales des océans Indien, Pacifique et Atlantique; sporadiquement dans l'Océan Pacifique oriental.

Südliche Bereiche des Indischen Pazifischen und Atlantischen Ozeans, sporadisches Auftreten im Ost-Pazifischen Ozean.

AUXIS Cuvier, 1829

Auxis rochei (Risso, 1810)

Tropical and subtropical waters of the Indo-Pacific and Atlantic oceans, including the Mediterranean Sea.

Aguas tropicales y subtropicales de los océanos Indico, Pacífico y Atlántico, incluyendo el Mar Mediterráneo.

Eaux tropicales et subtropicales des océans Indien, Pacifique et Atlantique, y compris la Mer Méditerranée.

Tropische und subtropische Gewässer des Indischen, Pazifischen und Atlantischen Ozeans, einschliesslich des Mittelmeeres.

Auxis thazard (Lacépède, 1800)

Tropical and subtropical waters of the Indo-Pacific and Atlantic oceans.

Aguas tropicales y subtropicales de los océanos Indico, Pacífico y Atlántico.

Eaux tropicales et subtropicales des océans Indien, Pacifique et Atlantique.

Tropische und subtropische Gewässer des Indischen, Pazifischen und Atlantischen Ozeans.

CYBIOSARDA Whitley, 1935

Cybiosarda elegans (Whitley, 1935)

* We have excluded *Gasterochisma melampus* Richardson, a species which is occasionally included in the family Scombridae.

Excluimos *Gasterochisma melampus* Richardson, especie que ocasionalmente se incluye en la familia Scombridae.

Nous avons exclu *Gasterochisma melampus* Richardson, espèce occasionnellement comprise dans la famille des Scombridae.

Wir haben *Gasterochisma melampus* Richardson nicht mit eingeschlossen. Diese Art wird hin und wieder in der Familie Scombridae mit eingeschlossen.

Coasts of Australia.

Costas de Australia.

Côtes de l'Australie.

An den Küsten von Australien.

EUTHYNNUS Lütken *in* Jordan and Gilbert, 1883

Euthynnus affinis (Cantor, 1849)

Warm and tropical waters of the Indo-Pacific Ocean, sporadic in the eastern Pacific Ocean.

Aguas cálidas y tropicales de los océanos Indico y Pacífico, esporádicamente en el Océano Pacífico oriental

Eaux chaudes et tropicales des Océans Indien et Pacifique; sporadiquement dans l'Ocean Pacifique Oriental.

Warme und tropische Gewässer des Indischen und Pazifischen Ozeans, sporadisches Auftreten im östlichen Pazifischen Ozean.

Euthynnus alletteratus (Rafinesque, 1810)

Warm and tropical waters of the Atlantic Ocean including the Mediterranean Sea. Sporadic occurrence in the Black Sea.

Aguas cálidas y tropicales del Océano Atlántico incluyendo el Mar Mediterráneo. Aparición esporádica en el Mar Negro.

Eaux Chaudes et tropicales de l'Océan Atlantique, y compris la Mer Méditerranée. Apparition sporadique dans la Mer Noire.

Warme und tropische Gewässer des Atlantischen Ozeans einschliesslich des Mittelmeeres, sporadisches Vorkommen im Schwarzen Meere.

Euthynnus lineatus Kishinouye, 1920

Warm and tropical waters of the eastern Pacific Ocean; stray specimen recorded from the central Pacific Ocean.

Aguas cálidas y tropicales del Océano Pacífico oriental; especímenes errantes registrados en el Océano Pacífico central.

Eaux chaudes et tropicales de l'Océan Pacifique oriental; specimens isolés signalés dans l'Océan Pacifique central.

Warme und tropische Gewässer des östlichen Pazifischen Ozeans, vereinzeltes Vorkommen im zentralen Pazifischen Ozean.

GRAMMATORCYNUS Gill, 1862

Grammatorcynus bicarinatus (Quoy and Gaimard, 1824)

Red Sea, absent from the Arabian Sea and Bay of Bengal; present off South East Asia, Australia, Philippines, Ryukus and Marshalls.

Mar Rojo, ausente del Mar Arábico y Golfo de Bengala; presente frente a la costa sudeste de Asia, Australia, Filipinas, Riukius y Marshall.

Mer Rouge, absent dans la Mer d'Oman et le Golfe du Bengale; présent au large de la côte sud de l'Asie orientale, Australie, Philippines, Ryu Kyu et Marshall.

Im Roten Meer, nicht vorkommend im Arabischen Meer und im Golf von Bengalen, vorkommend an der Küste von Südostasien, Australien, der Philippinen, Riukiu-Inseln und Marshall-Inseln.

GYMNOSARDA Gill, 1862

Gymnosarda unicolor (Rüppell, 1838)

Red Sea eastward to Society Islands, Marquesas, Marshalls and Japan.

En el Mar Rojo al este de las Islas Sociedad, Marquesas, Marshall y el Japón.

Dans la Mer Rouge à l'est des Iles de la Société, Marquises Marshall et Japon.

Vom Roten Meer östlich bis zu den Gesellschafts-Inseln, Marquesas-Inseln, Marshall-Inseln und Japan.

KATSUWONUS Kishinouye, 1915

Katsuwonus pelamis (Linnaeus, 1758)

Cosmopolitan in tropical and subtropical seas, absent from the Black Sea.

Cosmopolita en mares tropicales y subtropicales, ausente en el Mar Negro.

Cosmopolite dans les mers tropicales et subtropicales, absent dans la Mer Noire.

Kommt in allen tropischen und subtropischen Meeren vor mit Ausnahme des Schwarzen Meeres.

ORCYNOPSIS Gill, 1862

Orcynopsis unicolor (Geoffroy St. Hilaire, 1809)

West coast of Africa, northward from Dakar, also in the Mediterranean Sea.

Costa occidental del Africa, hacia el norte de Dakar, también en el Mar Mediterráneo.

Côte occidentale de l'Afrique, vers le nord à partir de Dakar, ainsi que dans la Mer Méditerranée.

An der Westküste von Afrika, nördlich von Dakar und auch im Mittelmeer.

RASTRELLIGER Jordan and Starks *in* Jordan and Dickenson, 1908

Rastrelliger brachysoma (Bleeker, 1851)

Malaysia, Indonesia, Solomons and Fiji.

Malasia, Indonesia, Salomones y Fidji.

Malaysia, Indonésie, îles Salomon et Fidji.

Malaysia, Indonesien, Salomon-Inseln und Fidschi-Inseln.

Rastrelliger faughni Matsui, 1967

Philippines, Formosa, and Indonesia.

Filipinas, Formosa e Indonesia.

Philippines, Formose et Indonésie.

Philippinen, Formosa und Indonesien.

Rastrelliger kanagurta (Cuvier, 1817)

East coast of Africa, Seychelles, Arabian Sea, eastward through Indonesia and off northern Australia to Melanesia and Micronesia, coast of People's Republic of China, and Ryukyus. Recent immigrant to the Mediterranean Sea.

Costa oriental del Africa, Seychelles, Mar Arábico, al este hasta Indonesia y frente a Australia septentrional hasta Melanesia y Micronesia, costa de la República Popular de China, y las Riukius. Desplazamiento reciente al Mar Mediterráneo.

Côte orientale de l'Afrique, Seychelles, Mer d'Oman, puis vers l'est en passant par l'Indonésie et au large de l'Australie septentrionale jusqu'en Mélanésie et Micronèsie, Côte de la République Populaire de Chine et Ryu Kyu. Récente immigration vers la Mer Méditerranée.

An der Ostküste von Afrika, Seychellen, Arabisches Meer, dann östlich bis Indonesien und an der Nordküste von Australien bis nach Melanesien und Mikronesien, an der Küste von der Volksrepublik China und den Riukiu-Inseln. Ist vor kurzem in das Mittelmeer eingewandert.

SARDA Cuvier, 1829

Sarda chiliensis (Cuvier *in* Cuvier and Valenciennes, 1831)

Eastern Pacific Ocean, California, Baja California, Peru, Chile but absent from truly tropical waters.

Océano Pacífico oriental, California, Baja California, Perú, Chile, pero ausente en aguas verdaderamente tropicales.

Océan Pacifique oriental, Californie, Basse Californie, Pérou, Chili, mais absent dans les eaux vraiment tropicales.

Im östlichen Pazifischen Ozean, Kalifornien, Nieder Kalifornien, Peru, Chile, nicht vorkommend in wirklich tropischen Gewässern.

Sarda orientalis (Temminck and Schlegel, 1844)

Coastal regions of the Indo-Pacific region, also present around many of the islands. East coast of Africa, Red Sea, Arabian Sea, Gulf of Bengal, western Australia, Indonesia, People's Republic of China, Formosa, Ryukyus, Japan, occasionally in Hawaiian waters. Not abundant in the eastern Pacific. Doubtful reports from the Atlantic Ocean.

Regiones costaneras de la región del Indico y del Pacífico, también presente alrededor de muchas de las islas. En la costa oriental del Africa, Mar Rojo, Mar Arábico, Golfo de Bengala, Australia occidental, Indonesia, República Popular de China, Formosa, Riukiu, Japón, ocasionalmente en aguas hawaianas. No es abundante en el Pacífico oriental. Reportes dudosos del Océano Atlántico.

Régions côtières des pays bordant les océans Indien et Pacifique, ainsi qu'aux alentours d'un grand nombre d'îles. Côte orientale d'Afrique, Mer Rouge, Mer d'Oman, Golfe du Bengale, Australie occidentale, Indonesie, République Populaire de Chine, Formose, Ryu kyu, Japon, parfois dans les eaux hawaiiennes. Peu abondant dans le Pacifique oriental. Présence douteuse dans l'Océan Atlantique.

In den Küstengebieten der Indo-Pazifischen Region und in der Nähe von vielen Inseln. An der Ostküste von Afrika, im Roten Meere, Arabischen Meere, Golf von Bengalen, West-Australien, Indonesien, Volksrepublik China, Formosa, Riukiu-Inseln, Japan, manchmal in den Gewässern der Hawaii-Inseln. Kommt nicht sehr häufig im östlichen Pazifischen Ozean vor. Fragwürdige Berichte des Vorkommens im Atlantischen Ozean.

Sarda sarda (Bloch, 1793)

Atlantic Ocean, Mediterranean and Black Seas.

Océano Atlántico, Mar Mediterráneo y Mar Negro.

Océan Atlantique, Mer Méditerranée et Mer Noire.

Atlantischer Ozean, Mittelmeer, Schwarzes Meer.

SCOMBER Linnaeus, 1758

Scomber australasicus (Cuvier *in* Cuvier and Valenciennes, 1831)

Western Pacific Ocean, off Australia, New Zealand, People's Republic of China, Japan, Ryukyus, Hawaii and Revillagigedos.

Océano Pacífico occidental, frente a Australia, Nueva Zelanda, República Popular de China, Japón, Riukiu, Hawaii y Revillagigedos.

Océan Pacifique Occidental, au large de l'Australie, la Nouvellex-Zélande. République Populaire de Chine, Japon, Ryu Kyu, Hawaii et Revillagigedos.

West-Pazifischer Ozean, Australien, Neuseeland, Volksrepublik China, Japan, Riukiu-Inseln, Hawaii-Inseln, Revillagigedo-Inseln.

Scomber japonicus Houttuyn, 1782

Temperate and warm waters of both hemispheres, present in the Mediterranean Sea.

En aguas templadas y cálidas de ambos hemisferios, presente en el Mar Mediterráneo.

Eaux chaudes et tempérés des deux hémisphères, présent dans la Mer Méditerranée.

In gemässigten und warmen Gewässern beider Hemisphären, kommt im Mittelmeer vor.

Scomber scombrus Linnaeus, 1758

Temperate and near-temperate waters of the Atlantic Ocean including the Mediterranean and the Black Seas.

Aguas templadas y casi templadas del Océano Atlántico, incluyendo el Mar Mediterráneo y el Mar Negro.

Eaux tempérées et semi-tempérées de l'Océan Atlantique comprenant la Mer Méditerranée et la Mer Noire.

In gemässigten und nahezu gemässigten Gewässern des Atlantischen Ozeans einschliesslich des Mittelmeeres und des Schwarzen Meeres.

SCOMBEROMORUS Lacépède, 1802

Scomberomorus cavalla (Cuvier, 1829)

Tropical western Atlantic Ocean.

Océano Atlántico tropical occidental.

Océan Atlantique tropical occidental.

West-tropischer Atlantischer Ozean.

Scomberomorus chinense (Cuvier *in* Cuvier and Valenciennes, 1831)

Western Pacific Ocean, from Vietnam to Japan.

Océano Pacífico occidental, desde Vietnam hasta el Japón.

Océan Pacifique occidental, depuis le Vietnam jusqu'au Japon.

West-Pazifischer Ozean von Vietnam bis Japan.

Scomberomorus commerson (Lacépède, 1800)

Indian and Western Pacific Oceans. Cape Good Hope, east Africa, Red Sea, eastward to Malaysia, Australia, Indonesia, Philippines, People's Republic of China, Formosa and Japan. Recent immigrant to the Mediterranean Sea.

Océanos Indico y del Pacífico occidental. Cabo de la Buena Esperanza, Africa oriental, Mar Rojo, al este de Malasia, Australia, Indonesia, Filipinas, República Popular de China, Formosa y Japón. Desplazamientos recientes al Mar Mediterráneo.

Océans Indien et Pacifique occidental. Cap de Bonne Espérance, Afrique Orientale, Mer Rouge, en direction de l'Est vers la Malaisie, l'Australie, l'Indonésie, les Philippines, la République Populaire de Chine, Formose et le Japon. Immigration récente vers la Mer Méditerranée.

Indischer und West-Pazifischer Ozean, Kap der Guten Hoffnung, Ostafrika, Rotes Meer östlich bis zu Malaysia, Australien, Indonesien, Philippinen, Volksrepublik China, Formosa und Japan. Ist vor kurzem in das Mittelmeer eingewandert.

Scomberomorus concolor (Lockington, 1879)

Gulf of California, formerly abundant in Monterey Bay, California.

Golfo de California, abundante también anteriormente en la Bahía de Monterrey, California.

Golfe de Californie, précédemment abondant dans la Baie de Monterrey, Californie.

Golf von Kalifornien, ehemals häufiger im Vorkommen im Bai von Monterey, Kalifornien.

Scomberomorus guttatus (Bloch and Schneider, 1801)

Indo-Pacific Ocean from India to Japan.

Océanos Indico y Pacífico, desde la India hasta el Japón.

Océans Indien et Pacifique despuis l'Inde jusqu-au Japon.

Im Indischen und Pazifischen Ozean von Indien bis nach Japan.

Scomberomorus lineolatus (Cuvier *in* Cuvier and Valenciennes, 1831)

Indian Ocean, east coast of Africa, eastward to India and Ceylon.

Océano Indico, costa este del Africa, hacia el este de India y Ceilán.

Océan Indien, côte orientale d'Afrique, en direction de l'Est vers l'Inde et Ceylan.

Im Indischen Ozean, an der Ostküste von Afrika östlich bis nach Indien und Ceylon.

Scomberomorus maculatus (Mitchill, 1815)

Tropical and subtropical waters of the western Atlantic Ocean.

Aguas tropicales y subtropicales del Océano Atlántico occidental.

Eaux tropicales et subtropicales de l'Océan Atlantique occidental.

Tropische und subtropische Gewässer des West-Atlantischen Ozeans.

Scomberomorus niphonius (Cuvier *in* Cuvier and Valenciennes, 1831)

China, Korea and Japan.

China, Corea y Japón.

Chine, Corée et Japón.

China, Korea und Japan.

Scomberomorus queenslandicus Munro, 1943

East and west coasts of Australia.

Costa oriental y occidental de Australia.

Côtes orientale et occidentale de l'Australie.

Ost und Westküste von Australien.

Scomberomorus regalis (Bloch, 1793)

Tropical and subtropical waters of the western Atlantic Ocean.

Aguas tropicales y subtropicales del Océano Atlántico occidental.

Eaux tropicales et subtropicales de l'Océan Atlantique occidental.

Tropische und subtropische Gewässer des West-Atlantischen Ozeans.

Scomberomorus semifasciatus (Macleay, 1884)

Tropical and semitropical waters off Queensland and the Northern Territory of Australia.

Aguas tropicales y semitropicales frente a Queensland y al Territorio Septentrional de Australia.

Eaux tropicales et semi-tropicales au large de Queensland et des territoires septentrionaux de l'Australie.

Tropische und halbtropische Gewässer von Queensland und dem Nordterritorium von Australien.

Scomberomorus sierra Jordan and Starks *in* Jordan, 1895

Eastern Pacific Ocean, from California south to Peru and around the Galapagos Islands.

Océano Pacífico oriental, desde el sur de California hasta el Perú y alrededor de las Islas Galápagos.

Océan Pacifique oriental, depuis la Californie au sud jusqu'au Pérou et autour des Iles Galapagos.

Ost-Pazifischer Ozean, von Kalifornien südlich bis Peru und in der Nähe der Galapagos-Inseln.

Scomberomorus sinensis (Lacépède, 1800)

Western Pacific Ocean, North China and

Japan. Present also in Cambodia but only in the Mekong River system — does not reproduce in fresh water.

Océano Pacífico occidental, China septentrional y Japón. Se encuentra también en Cambodia, pero solamente en el sistema del Río Mekong — no se reproduce en agua dulce.

Océan Pacifique occidental, Chine septentrionale et Japon. Présent aussi au Cambodge mais uniquement dans le réseau fluvial du Mékong — ne se reproduit pas en eau douce.

West-Pazifischer Ozean, Nordchina und Japan, kommt auch in Kambodscha vor, aber dort nur im Flussystem des Mekong —vermehrt sich nicht im Süsswasser.

Scomberomorus tritor (Cuvier *in* Cuvier and Valenciennes, 1831)

Eastern Atlantic, off west coast of Africa, and in the Mediterranean Sea.

Atlántico oriental, frente a la costa occidental del Africa, y en el Mar Mediterráneo.

Atlantique oriental, face à la côte occidentale d'Afrique et dans la Mer Méditerranée.

Ostatlantik, an der Westküste von Afrika und im Mittelmeer.

THUNNUS South, 1845

Thunnus alalunga (Bonnaterre, 1788)

Temperate and tropical waters of all oceans, including the Mediterranean Sea.

Aguas templadas y tropicales en todos los océanos, presente en el Mar Mediterráneo.

Eaux tempérées et tropicales de tous les océans, ainsi que la Mer Méditerranée.

In gemässigten und tropischen Gewässern aller Ozeane einschliesslich des Mittelmeeres.

Thunnus albacares (Bonnaterre, 1788)

Tropical and subtropical waters of the Indo-Pacific and Atlantic Oceans.

Aguas tropicales y subtropicales de los océanos Indico, Pacífico y Atlántico.

Eaux tropicales et subtropicales des Océans Indien, Pacifique et Atlantique.

In Tropischen und subtropischen Gewässern des Indischen, Pazifischen und Atlantischen Ozeans.

Thunnus atlanticus (Lesson, 1830)

Western Atlantic Ocean, Bermuda southward through the Caribbean Sea to Brazil.

Océano Atlántico occidental, al sur de Bermuda a través del Mar Caribe hasta Brasil.

Océan Atlantique occidental, des Bermudes vers le Sud à travers la Mer des Caraïbes jusqu'au Brésil.

Im West-atlantischen Ozean, von Bermuda-Inseln nach dem Süden im Karibischen Meere bis Brasilien.

Thunnus maccoyii (Castlenau, 1872)

Subtropical and temperate waters of the southern region of the Indo-Pacific and Atlantic Oceans.

Aguas subtropicales y templadas de la región meridional de los océanos Indico, Pacífico y Atlántico.

Eaux subtropicales et tempérées de la région méridionale des Océans Indien, Pacifique et Atlantique.

In subtropischen und gemässigten Gewässern der südlichen Bereiche des Indischen, Pazifischen und Atlantischen Ozeans.

Thunnus obesus (Lowe, 1839)

Tropical and subtropical waters of the Indo-Pacific and Atlantic Oceans.

Aguas tropicales y subtropicales de los océanos Indico, Pacífico y Atlántico.

Eaux tropicales et subtropicales des Océans Indien, Pacifique et Atlantique.

In tropischen und subtropischen Gewässern des Indischen, Pazifischen und Atlantischen Ozeans.

Thunnus thynnus (Linnaeus, 1758)

Temperate waters of the north Pacific Ocean, south and north Atlantic Ocean, and in the Mediterranean and the Black Seas.

Aguas templadas del Océano Pacífico norte, al sur y al norte del Océano Atlántico, y en el Mar Mediterráneo y Mar Negro.

Eaux tempérées de l'Ocean Pacifique nord, au sud et au nord de l'Océan Atlantique, dans la Mer Méditerranée et dans la Mer Noire.

In Gewässern des Nord-Pazifischen, Süd und Nord-Atlantischen Ozeans, im Mittelmeere und im Schwarzen Meere.

Thunnus tonggol (Bleeker, 1851)

Indo-West Pacific Ocean, from southern Japan, south to Australia (north, east and west coasts), throughout most of the Indian Ocean, including the Red Sea but absent from most of the east African coast.

Océano Indico, Océano Pacífico occidental, desde el sur del Japón hasta Australia (costas norte, este y oeste), a través de casi todo el Océano Indico, incluyendo el Mar Rojo, pero ausente en la mayor parte de la costa oriental africana.

Océan Indien, Océan Pacifique occidental, depuis le sur du Japon jusqu'a l'Australie (Côtes nord, est et ouest), à travers la plus grande partie de l'Océan Indien, y compris la Mer Rouge, mais absent sur presque toute la côte orientale d'Afrique.

Im Indischen und West-Pazifischen Ozean, von Südjapan südlich bis Australien (Nord, Ost und Westküste), innerhalb fast des ganzen Indischen Ozeans einliesslich des Roten Meeres. Kommt aber nicht am grössten Teil der Ostafrikanischen Küste vor.

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Schaefer and Marr, 1948b
Ueyanagi and Watanabe, 1962
Wade, 1949
Watanabe, 1962
Watanabe, 1964

DISTRIBUTION
Gorbunova, 1963
Gorbunova, 1965c
Hotta, 1952
Hotta, 1955
Hunter and Mitchell, 1966
Idyll and de Sylva, 1963d
Klawe, 1960b
Klawe, 1963
Klawe and Shimada, 1959
Mead, 1951
Richards and Randall, 1967
Schaefer and Marr, 1948b
Wade, 1949
Watanabe, 1962

COLLECTION METHOD
Fisheries Agency, Japan, 1970a
Hotta, 1952
Inoue et al., 1967
Parona, 1919
Watanabe, 1962
Yabe et al., 1953

GENERAL BIOLOGY
Fisheries Agency, Japan, 1970a
Herald, 1951
Hotta, 1952
Hotta, 1955
Inoue et al., 1967
Inoue et al., 1970
Kishinouye, 1924
Kumaran, 1964b
Marukawa, 1939
Parona, 1919
Yabe et al., 1953

Cybiosarda elegans

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Jones and Silas, 1960

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Euthynnus sp.

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION

Ueyanagi and Ahlstrom, 1963
Ueyanagi and Watanabe, 1964

DISTRIBUTION
Blackburn, 1965
Klawe, 1969
Parin, 1967a
Yabe et al., 1963

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Blackburn, 1965
Ueyanagi, 1966b

JUVENILES

DESCRIPTION
Nichols and Murphy, 1944

DISTRIBUTION
Nakamura, 1965

COLLECTION METHOD
Nichols and Murphy, 1944

GENERAL BIOLOGY
Nakamura, 1965
Ueyanagi, 1966b

Euthynnus affinis

EGGS

DESCRIPTION
Delsman, 1931
Kamiya, 1924

DISTRIBUTION
Gorbunova, 1965c
Kamiya, 1924

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Anonymous, 1970a
Anonymous, 1970b
Kamiya, 1924

LARVAE

DESCRIPTION
Anonymous, 1970a
Anonymous, 1970b
Delsman, 1931
Gorbunova, 1963
Gorbunova, 1965b
Jones and Kumaran, 1964
Kagoshima Prefectural Fisheries Station, 1926
Kagoshima Prefectural Fisheries Station, 1927
Kikawa et al., 1963b
Kishinouye, 1926
Matsumoto, 1958
Matsumoto, 1959
Matsumoto, 1966b
Wade, 1951
Williams, 1963b
Yabe et al., 1963

DISTRIBUTION
Fursa, 1969
Gorbunova, 1963
Gorbunova, 1965a
Gorbunova, 1965b
Gorbunova, 1965c
Gorbunova, 1966
Jones and Kumaran, 1963
Kikawa et al., 1963b
Matsumoto, 1958

Matsumoto, 1959
Mori et al., 1969
Nakamura and Matsumoto, 1966
Strasburg, 1960
Wade, 1951
Williams, 1963b

COLLECTION METHOD
Mori et al., 1969
Nakamura and Matsumoto, 1966
Strasburg, 1960

GENERAL BIOLOGY
Anonymous, 1970a
Anonymous, 1970b

JUVENILES

DESCRIPTION
Günther, 1889
Jones, 1960b
Jones and Kumaran, 1964
Jones and Silas, 1960
Kishinouye, 1919
Kishinouye, 1923
Kishinouye, 1924
Ueyanagi and Watanabe, 1962
Wade, 1950

DISTRIBUTION
Gorbunova, 1965c
Günther, 1889
Higgins, 1970
Kikawa et al., 1963b
Mori et al., 1969
Ronquillo, 1954
Schaefer, 1948
Wade, 1950

COLLECTION METHOD
Fisheries Agency, Japan, 1970a
Inoue et al., 1967
Mori et al., 1969
Yabe et al., 1953

GENERAL BIOLOGY
Fisheries Agency, Japan, 1970a
Herald, 1951
Higgins, 1970
Inoue et al., 1967
Inoue et al., 1970
Kikawa et al., 1963b
Kishinouye, 1924
Kumaran, 1964b
Yabe et al., 1953

Euthynnus alletteratus

EGGS

DESCRIPTION
Marchal, 1963c
Padoa, 1956

DISTRIBUTION
Gorbunova, 1965c
Marchal, 1963c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Houde and Richards, 1969
Houde and Richards, 1970

LARVAE

DESCRIPTION
Barthélémy-Lefèvre, 1955
Belloc, 1955
Bini, 1968
Ehrenbaum, 1924
Gorbunova, 1963
Houde and Richards, 1969
Houde and Richards, 1970
Kazanova, 1962
Klawe and Shimada, 1959
Marchal, 1963b
Marchal, 1963c
Matsumoto, 1959
Padoa, 1956
Sanzo, 1909a
Weeks, 1970
Zharov and Zhudova, 1967
Zhudova, 1969a
Zhudova, 1969b

DISTRIBUTION
Barthélémy-Lefèvre, 1955
Belloc, 1955
Conand, 1970
Gorbunova, 1963
Gorbunova, 1965c

Gorbunova, 1966
Gorbunova and Salabarría, 1967
Kazanova, 1962
Klawe, 1960a
Klawe and Shimada, 1959
Marchal, 1963c
Matsumoto, 1959
Richards, 1969b
Richards et al., 1969a
Richards et al., 1969b
Richards et al., 1970
Zharov and Zhudova, 1967
Zhudova, 1969a
Zhudova, 1969b

COLLECTION METHOD
Conand, 1970
Weeks, 1970

GENERAL BIOLOGY
Conand, 1970
Houde and Richards, 1969
Houde and Richards, 1970
Zhudova, 1969a

JUVENILES

DESCRIPTION
Bini, 1968
Demir, M., 1963a
Gorbunova, 1963
Klawe, 1961a
Klawe and Shimada, 1959
Marchal, 1963b
Marchal, 1963c
Matsumoto, 1959
Potthoff and Richards, 1970
Ueyanagi and Watanabe, 1962

DISTRIBUTION
Bullis, 1955
Demir, M., 1961
Demir, M., 1963a
De Sylva and Rathjen, 1961
Dragovich, 1970
Gorbunova, 1963
Gorbunova, 1965c
Klawe, 1961a
Klawe and Shimada, 1959
Marchal, 1963c
Matsumoto, 1959
Potthoff and Richards, 1970
Sund and Richards, 1967

COLLECTION METHOD
Potthoff and Richards, 1970

GENERAL BIOLOGY
Bullis, 1955
Demir, M., 1961
De Sylva and Rathjen, 1961
Dragovich, 1970
Potthoff and Richards, 1970

Euthynnus lineatus

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Calkins and Klawe, 1963
Matsumoto, 1959
Matsumoto, 1966b
Mead, 1951

DISTRIBUTION
Calkins and Klawe, 1963
Klawe, 1963
Klawe et al., 1970
Matsumoto, 1959
Mead, 1951

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Klawe et al., 1970

JUVENILES

DESCRIPTION
Calkins and Klawe, 1963
Clemens, 1956
Matsubara, 1955
Matsumoto, 1959
Mead, 1951
Schaefer and Marr, 1948b
Ueyanagi and Watanabe, 1962

DISTRIBUTION
Calkins and Klawe, 1963
Hunter and Mitchell, 1966
Klawe, 1960b
Klawe, 1963
Matsumoto, 1959
Mead, 1951
Schaefer, 1948
Schaefer, 1958
Schaefer and Marr, 1948b

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Calkins and Klawe, 1963
Clemens, 1956

Grammatorcynus bicarinatus

EGGS

DESCRIPTION
No references found

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Jones and Kumaran, 1964
Silas, 1963a
Wade, 1951

DISTRIBUTION
Gorbunova, 1965c
Gorbunova, 1966
Mori et al., 1969
Silas, 1963a
Wade, 1951

COLLECTION METHOD
Mori et al., 1969

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Jones and Kumaran, 1964
Silas, 1963a
Wade, 1951

DISTRIBUTION
Gorbunova, 1965c
Mori et al., 1969
Silas, 1963a
Wade, 1951

COLLECTION METHOD
Mori et al., 1969

GENERAL BIOLOGY
No references found

Gymnosarda unicolor

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Gorbunova, 1963

DISTRIBUTION
Gorbunova, 1963

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Jones and Silas, 1960

DISTRIBUTION
No references found

COLLECTION METHOD
Fisheries Agency, Japan, 1970a

GENERAL BIOLOGY
Fisheries Agency, Japan, 1970a

Katsuwonidae

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
No references found

DISTRIBUTION
Blackburn, 1965
Sette et al., 1954

COLLECTION METHOD
Sette et al., 1954

GENERAL BIOLOGY
Blackburn, 1965
Mito, 1967

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
Watanabe, 1958

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Katsuwonus pelamis

EGGS

DESCRIPTION
Kawasaki, 1965
Mito, 1961
Postel, 1963a
Roux, 1961
Waldron, 1963

DISTRIBUTION
Gorbunova, 1965c
Jones and Silas, 1963
Matsuda, 1969

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Kawasaki, 1964
Matsuda, 1969

LARVAE

DESCRIPTION
Barthélémy-Lefèvre, 1955
Belloc, 1955
Bini, 1968
Ehrenbaum, 1924
Gorbunova, 1963
Howell and Juarez, 1954
Ishiyama and Okada, 1957
Jones, 1960a

Jones and Kumaran, 1964
Jones and Silas, 1963
Kagoshima Prefectural Fisheries Station, 1926
Kagoshima Prefectural Fisheries Station, 1927
Kawasaki, 1965
Kazanova, 1962
Kishinouye, 1926
Kubo, 1966
Marchal, 1963b
Matsumoto, 1958
Matsumoto, 1966b
Matsumoto, 1968
Mito, 1967
Nakamura, 1959
Nankai Regional Fisheries Research Laboratory, 1967
Ochiai, 1965
Padoa, 1956
Postel, 1963a
Roux, 1961
Shimada, 1951b
Shirota, 1970
Sun', 1960
Ueyanagi and Watanabe, 1964
Ueyanagi et al., 1969a
Wade, 1951
Waldron, 1963
Yabe, 1953b
Yabe, 1955
Yabe and Ueyanagi, 1962a
Yabe and Ueyanagi, 1962b
Yabe et al., 1963
Zharov and Zhudova, 1967
Zhudova, 1969a
Zhudova, 1969b

DISTRIBUTION

Anonymous, 1970a
Anonymous, 1970b
Barkley, 1969
Barthélémy-Lefèvre, 1955
Belloc, 1955
Blackburn, 1965
Brock, 1959
Bureau of Commercial Fisheries, 1963
Conand, 1970
Far Seas Fisheries Research Laboratory, 1969
Fisheries Agency, Japan, 1964
Fisheries Agency, Japan, 1965
Fisheries Agency, Japan, 1966
Fisheries Agency, Japan, 1970b
Gorbunova, 1963
Gorbunova, 1965a
Gorbunova, 1965c
Gorbunova, 1966
Gorbunova and Salabarría, 1967
Hattori, 1965
Jones, 1960a
Jones and Kumaran, 1963
Jones and Silas, 1963
Joseph and Calkins, 1969
Kawasaki, 1964
Kawasaki, 1965
Kazanova, 1962
Klawe, 1960a
Klawe, 1963
Klawe, 1969
Klawe, 1970
Kubo, 1966
Lim and Lee, 1970
Masuda, 1963
Matsuda, 1969
Matsumoto, 1958
Matsumoto, 1966a
Mori, 1970
Nakamura, 1959
Nakamura and Matsumoto, 1966
Parin, 1968
Postel, 1963a
Richards, 1967
Richards, 1969a
Richards, 1969b
Richards et al., 1969a
Richards et al., 1969b
Richards et al., 1970
Rothschild, 1963
Rothschild, 1965
Schaefer, 1948
Schaefer, 1958
Schaefer, 1959
Schaefer, 1960
Schaefer, 1961
Sette and Rothschild, 1966
Shimada, 1951b
Simmons, 1969
Strasburg, 1960
Sun', 1960
Ueyanagi, 1967a
Ueyanagi, 1967b
Ueyanagi, 1968a
Ueyanagi, 1968b

Ueyanagi, 1969b
Ueyanagi, 1969c
Ueyanagi, 1970
Ueyanagi et al., 1969a
Ueyanagi et al., 1969b
Wade, 1951
Waldron, 1963
Weeks, 1970
Yabe, 1953b
Yabe, 1954
Yabe, 1955
Yabe and Ueyanagi, 1962a
Yabe et al., 1963
Zharov and Zhudova, 1967
Zhudova, 1969a
Zhudova, 1969b

COLLECTION METHOD

Conand, 1970
Fisheries Agency, Japan, 1964
Fisheries Agency, Japan, 1966
Fisheries Agency, Japan, 1970b
Hattori, 1964
Kagoshima Prefectural Fisheries Station, 1926
Kagoshima Prefectural Fisheries Station, 1927
Laurs, 1970
Lim and Lee, 1970
Masuda, 1963
Nakamura, 1959
Nakamura and Matsumoto, 1966
Richards, 1969a
Shimada, 1951b
Strasburg, 1960
Ueyanagi, 1967b
Ueyanagi et al., 1969b
Yabe, 1953b

GENERAL BIOLOGY

Anonymous, 1970a
Anonymous, 1970b
Barkley, 1969
Bini, 1952
Blackburn, 1965
Conand, 1970
Fisheries Agency, Japan, 1964
Joseph and Calkins, 1969
Kagoshima Prefectural Fisheries Station, 1926
Kagoshima Prefectural Fisheries Station, 1927
Kawasaki, 1964
Kawasaki, 1965
Lim and Lee, 1970
Matsuda, 1969
Matsumoto, 1960
Matsumoto, 1966a
Nakamura, 1959
Rothschild, 1963
Rothschild, 1965
Shirota, 1970
Strasburg, 1959
Ueyanagi, 1967b
Ueyanagi, 1968a
Ueyanagi, 1968b
Ueyanagi, 1969b
Ueyanagi, 1969c
Ueyanagi, 1970
Zhudova, 1969a

JUVENILES

DESCRIPTION

Bini, 1968
Eckles, 1949
Gorbunova, 1963
Howell and Juarez, 1954
Jones, 1960a
Jones and Kumaran, 1964
Jones and Silas, 1960
Jones and Silas, 1963
Kagoshima Prefectural Fisheries Station, 1926
Kagoshima Prefectural Fisheries Station, 1927
Kawasaki, 1965
Kishinouye, 1919
Kishinouye, 1922
Kishinouye, 1924
Kishinouye, 1926
Klawe, 1961a
Klawe and Shimada, 1959
Marchal, 1963b
Marr, 1948
Marukawa, 1921
Matsubara, 1955
Matsumoto, 1961
Matsumoto, 1968
Ochiai, 1965
Okamura and Marukawa, 1909
Postel, 1963a
Potthoff and Richards, 1970
Schaefer and Marr, 1948a

Shimada, 1951a
Shimada, 1951b
Suda, 1953
Ueyanagi and Watanabe, 1962
Wade, 1950
Waldron, 1963

DISTRIBUTION
Anonymous, 1941
Ashmole and Ashmole, 1967
Bini, 1952
Bureau of Commercial Fisheries, 1963
Bureau of Commercial Fisheries, 1964
Dragovich, 1970
Eckles, 1949
Fisheries Agency, Japan, 1964
Fujino, 1970
Gorbunova, 1963
Gorbunova, 1965c
Higgins, 1967
Higgins, 1970
Hotta, 1953
Inanami, 1942
Jones and Silas, 1963
Kamimura, 1966
Kawasaki, 1965
Klawe, 1960b
Klawe, 1961a
Klawe, 1963
Klawe and Shimada, 1959
Koga, 1958
Marr, 1948
Matsuda, 1969
Matsumoto, 1961
Nakamura, 1959
Nakamura, 1965
Nakamura and Hiyama, 1957
Nakamura and Matsumoto, 1966
Nakamura Research Staff, 1949
Okamura and Marukawa, 1909
Potthoff and Richards, 1970
Rothschild, 1965
Schaefer, 1948
Schaefer, 1958
Schaefer, 1959
Schaefer, 1960
Schaefer, 1961
Schaefer and Marr, 1948a
Shimada, 1951a
Shimada, 1951b
Simmons, 1969
Suda, 1953
Tominaga, 1957
Ueyanagi, 1965
Ueyanagi, 1967b
Wade, 1950
Waldron, 1963
Yabe and Mori, 1948
Yabe et al., 1963

COLLECTION METHOD
Anonymous, 1941
Bureau of Commercial Fisheries, 1964
Fisheries Agency, Japan, 1964
Fisheries Agency, Japan, 1970a
Hotta, 1953
Hotta and Ogawa, 1955
Inoue et al., 1967
Kamimura, 1966
Koga, 1958
Mori, 1969
Nakamura, 1959
Nomura, 1952
Okamura and Marukawa, 1909
Potthoff and Richards, 1970
Schaefer and Marr, 1948a
Shimada, 1951b
Ueyanagi, 1965
Ueyanagi, 1967b
Yabe et al., 1953
Yabuta, 1953

GENERAL BIOLOGY
Bini, 1952
Dragovich, 1970
Fisheries Agency, Japan, 1964
Fisheries Agency, Japan, 1970a
Herald, 1951
Higgins, 1970
Hotta, 1953
Inoue et al., 1967
Kamimura, 1966
Kishinouye, 1917
Kishinouye, 1924
Marukawa, 1939
Matsuda, 1969
Nakamura, 1965
Okamura and Marukawa, 1909
Potthoff and Richards, 1970
Tominaga, 1957
Ueyanagi, 1967b
Waldron, 1963

Yabe and Mori, 1948
Yabe et al., 1953
Yabuta, 1953

Orcynopsis unicolor

EGGS

DESCRIPTION
No references found

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
No references found

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Ehrenbaum, 1924
Padoa, 1956
Šoljan, 1948
Šoljan, 1963

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Rastrelliger sp.

EGGS

DESCRIPTION
Boonprakob, 1963
Boonprakob, 1965

DISTRIBUTION
Boonprakob, 1963
Boonprakob, 1965
Jones and Rosa, 1967
Panikkar, 1955

COLLECTION METHOD
Boonprakob, 1965

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Boonprakob, 1965
Matsui, 1963
Matsui, 1970
Peter, 1967
Peter, 1969a

DISTRIBUTION
Boonprakob, 1965
Gorbunova, 1966
Jones and Rosa, 1967
Matsui, 1963
Matsui, 1970
Peter, 1967
Peter, 1969a

COLLECTION METHOD
Boonprakob, 1965
Matsui, 1970
Peter, 1969a

GENERAL BIOLOGY
Matsui, 1970

JUVENILES

DESCRIPTION
Matsui, 1970

DISTRIBUTION
Jones and Rosa, 1967

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Jones and Rosa, 1967
Rao, K. S., 1964

Rastrelliger brachysoma

EGGS

DESCRIPTION
No references found

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Gorbunova, 1965b

DISTRIBUTION
Gorbunova, 1965b
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
Druzhinin, 1970

GENERAL BIOLOGY
Druzhinin, 1970

Rastrelliger faughni

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
No references found
DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Manacop, 1956

DISTRIBUTION
Manacop, 1956

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Rastrelliger kanagurta

EGGS

DESCRIPTION
Balakrishnan, 1957

Delsman, 1926
Delsman, 1931
Devanesan and John, 1940
Jones and Rosa, 1965

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
Balakrishnan, 1957

GENERAL BIOLOGY
Jones and Rosa, 1965

LARVAE

DESCRIPTION
Delsman, 1926
Delsman, 1931
Gorbunova, 1963
Jones and Kumaran, 1964

DISTRIBUTION
Balakrishnan, 1957
Gorbunova, 1963
Gorbunova, 1965c
Kuthalingam, 1956
Ueyangi et al., 1969b

COLLECTION METHOD
Ueyanagi et al., 1969b

GENERAL BIOLOGY
Balakrishnan, 1957
Jones and Rosa, 1965
Rao and Rao, 1957

JUVENILES

DESCRIPTION
Appannasastry, 1969
Jones and Kumaran, 1964
Manacop, 1956

DISTRIBUTION
Appannasastry, 1969
Balakrishnan, 1957
Basheeruddin and Nayar, 1962
Chacko, 1955
Gorbunova, 1965c
Jones and Rosa, 1965
Kishinouye, 1924
Manacop, 1956
Mori et al., 1969
Rao, K. V., 1964
Rao and Basheeruddin, 1953
Sekharan, 1958

COLLECTION METHOD
Druzhinin, 1970
George and Annigeri, 1960
Mori et al., 1969

GENERAL BIOLOGY
Appannasastry, 1969
Balakrishnan, 1957
Bennet, 1967
Bhimachar and George, 1952
Druzhinin, 1970
George, 1964
George and Annigeri, 1960
George and Banerji, 1968
Manacop, 1956
Pradhan, 1956
Rao, K. V., 1964
Rao, K. V. Narayana, 1964
Rao and Basheeruddin, 1953
Rao and Rao, 1957
Sekharan, 1958

Sarda sp.

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Jones and Kumaran, 1964
Klawe, 1961b
Nankai Regional Fisheries Laboratory, 1967
Ueyanagi and Ahlstrom, 1963
Ueyanagi et al., 1963

DISTRIBUTION
Fisheries Agency, Japan, 1963
Klawe, 1961b
Yabe et al., 1963

COLLECTION METHOD
Fisheries Agency, Japan, 1963

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Sarda chiliensis

EGGS

DESCRIPTION
Ancieta, 1964
Barnhart, 1927
Orton, 1953a
Orton, 1953b

DISTRIBUTION
Ancieta, 1964
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Ancieta, 1964
Barnhart, 1927
Orton, 1953a
Orton, 1953b
Pinkas, 1961

DISTRIBUTION
Ancieta, 1964
Gorbunova, 1965c
Pinkas, 1961
Silas, 1964

COLLECTION METHOD
Pinkas, 1961

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Ancieta, 1964
Klawe, 1961b
Klawe, 1962
Pinkas, 1961

DISTRIBUTION
Ancieta, 1964
Gorbunova, 1965c
Klawe, 1961b
Klawe, 1962
Pinkas, 1961

COLLECTION METHOD
Klawe, 1961b
Klawe, 1962
Pinkas, 1961

GENERAL BIOLOGY
Bini, 1952

Sarda orientalis

EGGS

DESCRIPTION
Kamiya, 1922
Mito, 1961

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

General biology
Kamiya, 1922

LARVAE

Description
Gorbunova, 1963
Mito, 1961

Distribution
Gorbunova, 1963
Gorbunova, 1965c
Silas, 1964

Collection method
Hattori, 1964

General biology
No references found

JUVENILES

Description
Jones, 1961
Jones and Kumaran, 1964
Jones and Silas, 1960
Kikawa et al., 1963a
Kishinouye, 1919
Kishinouye, 1923
Silas, 1963b
Silas, 1964

Distribution
Gorbunova, 1965c
Kikawa et al., 1963a
Silas, 1963b

Collection method
Fisheries Agency, Japan, 1970a
Inoue et al., 1967
Yabe et al., 1953

General biology
Fisheries Agency, Japan, 1970a
Inoue et al., 1967
Inoue et al., 1970
Kumaran, 1964b
Silas, 1964
Yabe et al., 1953

Sarda sarda

EGGS

Description
Altan, 1957a
Bănărescu, 1964
Belloc, 1954
Demir, M., 1957
Demir, M., 1963b
Demir and Demir, 1961
Krotov, 1938
Mel'nichuk, 1941
Oven, 1959
Padoa, 1956
Parona, 1919
Sanzo, 1909a
Sanzo, 1932a
Sette, 1943
Silas, 1964
Vodianitskii, 1936
Vodianitskii and Kazanova, 1954
Zusser, 1954

Distribution
Acara, 1957
Dekhnik and Pavlovskaia, 1950
Demir, M., 1963b
Demir and Demir, 1961
Georgiev et al., 1963
Gorbunova, 1965c
Kosiakina, 1938
Krotov, 1938
Maliatskii, 1940
Mayorova and Tkacheva, 1959
Nikolov, 1960
Vodianitskii, 1939
Zusser, 1954

Collection method
No references found

General biology
Acara, 1957
Demir, M., 1957
Demir and Demir, 1961
Mayorova and Tkacheva, 1959
Mayorova and Tkacheva, 1960
Oven, 1959
Parona, 1919
Sanzo, 1909a

Silas, 1964
Vinohradov, 1948

LARVAE

DESCRIPTION
Altan, 1957a
Bănărescu, 1964
Belloc, 1954
Bini, 1968
Demir, M., 1963b
Ehrenbaum, 1924
Mel'nichuk, 1941
Padoa, 1956
Parona, 1919
Sanzo, 1909a
Sanzo, 1932a
Vodianitskii, 1936
Vodianitskii and Kazanova, 1954
Zusser, 1954

DISTRIBUTION
Dekhnik et al., 1966
Demir, M., 1963b
Devedjian, 1926
Georgiev et al., 1963
Gorbunova, 1965c
Gorbunova, 1966
Gorbunova and Salabarría, 1967
Mayorova and Tkacheva, 1959
Nikolov, 1960
Vodianitskii, 1939

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Parona, 1919
Sanzo, 1909a
Vinohradov, 1948

JUVENILES

DESCRIPTION
Bănărescu, 1964
Belloc, 1954
Bini, 1968
De Buen, 1930
De Buen, 1932
Demir, M., 1963b
Idyll and de Sylva, 1963a
Klawe, 1961a
Klawe and Shimada, 1959
Meyer, 1956
Padoa, 1956
Šoljan, 1948
Šoljan, 1963

DISTRIBUTION
Borcea, 1929
Borcea, 1933
De Buen, 1930
De Buen, 1932
Demir, M., 1957
Demir, M., 1963b
Devedjian, 1926
Furnestin et al., 1958
Gorbunova, 1965c
Idyll and de Sylva, 1963a
Klawe, 1961a
Klawe and Shimada, 1959
Krotov, 1938
Mayorova and Tkacheva, 1959
Nikolov, 1960
Nümann, 1953
Nümann, 1955
Serbétis, 1955
Zusser, 1954

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Krotov, 1938
Meyer, 1956
Nümann, 1955
Parona, 1919
Porumb and Porumb, 1959

Scomber sp.

EGGS

DESCRIPTION
No references found

DISTRIBUTION
Matuda, 1966

COLLECTION METHOD
Matuda, 1966

GENERAL BIOLOGY
Matuda, 1966

LARVAE

DESCRIPTION
Ueyanagi et al., 1963

DISTRIBUTION
Hattori, 1964
Klawe, 1969
Matuda, 1966
Yokota et al., 1961

COLLECTION METHOD
Hattori, 1964
Matuda, 1966

GENERAL BIOLOGY
Hattori, 1964
Matuda, 1966
Yokota et al., 1961

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
Dragovich, 1970
Hattori, 1964

COLLECTION METHOD
Hattori, 1964
Hotta and Ogawa, 1955

GENERAL BIOLOGY
Dragovich, 1970
Hattori, 1964
Iizuka and Kotaki, 1969

Scomber australasicus

EGGS

DESCRIPTION
Anonymous, 1966
Mito, 1960
Mito, 1961

DISTRIBUTION
Anonymous, 1961
Anonymous, 1962a
Anonymous, 1962b
Anonymous, 1965
Anonymous, 1966
Anonymous, 1969
Matsuda, 1969
Uchida and Dotsu, 1958

COLLECTION METHOD
Anonymous, 1961
Anonymous, 1962a
Uchida and Dotsu, 1958

GENERAL BIOLOGY
Anonymous, 1961
Anonymous, 1962a
Anonymous, 1962b
Anonymous, 1965
Anonymous, 1966
Anonymous, 1969
Matsuda, 1969
Mito, 1960
Uchida and Dotsu, 1958

LARVAE

DESCRIPTION
Mito, 1961
Shimomura and Fukataki, 1957
Yabe, 1953a

DISTRIBUTION
Anonymous, 1961
Anonymous, 1962a
Anonymous, 1962b
Anonymous, 1965
Anonymous, 1966
Anonymous, 1969
Matsuda, 1969
Nomura, 1959
Shimomura and Fukataki, 1957
Tanoue, 1956
Tanoue, 1961
Tanoue and Tamari, 1960
Uchida and Dotsu, 1958
Yokota et al., 1961

COLLECTION METHOD
Anonymous, 1961
Anonymous, 1962a
Anonymous, 1966
Nomura, 1959
Shimomura and Fukataki, 1957
Tanoue, 1961

Tanoue and Tamari, 1960
Uchida and Dotsu, 1958

GENERAL BIOLOGY
Anonymous, 1961
Anonymous, 1962a
Anonymous, 1962b
Anonymous, 1965
Anonymous, 1969
Matsuda, 1969
Shimomura and Fukataki, 1957
Tanoue, 1956
Tanoue, 1961
Tanoue and Tamari, 1960
Uchida and Dotsu, 1958
Yokota et al., 1961

JUVENILES

DESCRIPTION
Manacop, 1956
Shimomura and Fukataki, 1957

DISTRIBUTION
Abe et al., 1968
Anonymous, 1962b
Anonymous, 1969
Matsuda, 1969
Shimomura and Fukataki, 1957
Tanoue, 1956
Tanoue, 1961
Uchida and Dotsu, 1958

COLLECTION METHOD
Shimomura and Fukataki, 1957
Tanoue, 1961
Uchida and Dotsu, 1958

GENERAL BIOLOGY
Anonymous, 1962b
Anonymous, 1969
Matsuda, 1969
Shimomura and Fukataki, 1957
Tanoue, 1956
Tanoue, 1961
Uchida and Dotsu, 1958

Scomber japonicus

EGGS

DESCRIPTION
Ahlstrom, 1956
Dekhnik, 1959
Demir, N., 1961
Fry, 1936a
Il'ina, 1951
Jones and Kumaran, 1964
Kamiya, 1916
Kamiya, 1924
Kamiya, 1925
Kramer, 1960
Kramer, 1969
Mito, 1960
Mito, 1961
Motoda, 1955a
Motoda, 1955b
Ochiai, 1965
Uchida et al., 1958
Watanabe, 1970

DISTRIBUTION
Dekhnik, 1959
Demir, N., 1961
Devedjian, 1926
Fry, 1936b
Gorbunova, 1965c
Hattori, 1965
Il'ina, 1951
Kamiya, 1916
Kamiya, 1924
Kamiya, 1925
Kawasaki, 1968
Kramer, 1960
Kramer, 1969
Matsuda, 1969
Motoda, 1955a
Motoda, 1955b
Motoda and Anraku, 1955
Ochiai, 1965
Odate, 1961
Okiyama, 1965
Roedel, 1949
Sano and Tamura, 1958
Watanabe, 1970
Zviagina, 1961

COLLECTION METHOD
Dekhnik, 1959

Fukataki, 1956
Kamiya, 1916
Kamiya, 1925
Kawasaki, 1968
Kramer, 1960
Motoda, 1955a
Motoda, 1955b
Motoda and Anraku, 1955
Odate, 1961
Okiyama, 1965
Sano and Tamura, 1958
Zviagina, 1961

General biology
Dekhnik, 1959
Fukataki, 1956
Hattori, 1965
Il'ina, 1951
Kamiya, 1916
Kamiya, 1924
Kamiya, 1925
Kawasaki, 1968
Kramer, 1960
Matsuda, 1969
Mito, 1960
Motoda, 1955a
Motoda, 1955b
Motoda and Anraku, 1955
Ochiai, 1965
Odate, 1961
Okiyama, 1965
Sano and Tamura, 1958
Watanabe, 1970
Zviagina, 1961

LARVAE

Description
Ahlstrom, 1956
Bini, 1968
Dekhnik, 1959
Demir, N., 1961
Ehrenbaum, 1924
Fry, 1936a
Jones and Kumaran, 1964
Kamiya, 1916
Kamiya, 1925
Kramer, 1960
Kramer, 1969
Mito, 1961
Mito, 1966
Nomura, 1959
Ochiai, 1965
Padoa, 1956
Roedel, 1949
Shirota, 1970
Uchida et al., 1958
Watanabe, 1970

Distribution
Ahlstrom, 1953
Ahlstrom, 1954
Ahlstrom, 1956
Ahlstrom, 1958
Ahlstrom, 1959
Ahlstrom and Kramer, 1955
Ahlstrom and Kramer, 1956
Ahlstrom and Kramer, 1957
Conand, 1970
Dekhnik, 1959
Demir, N., 1961
Fry, 1936b
Fukataki, 1956
Gorbunova, 1965c
Hattori, 1965
Hattori, 1970
Hayano, 1954
Il'ina, 1951
Kawasaki, 1968
Kobayashi, 1960
Kobayashi and Abe, 1962
Kramer, 1960
Kramer, 1969
Kramer and Smith, 1970
Matsuda, 1969
Nomura, 1959
Ochiai, 1965
Odate, 1961
Okiyama, 1965
Roedel, 1949
Uchida, 1954
Watanabe, 1970

Collection method
Conand, 1970
Dekhnik, 1959
Fukataki, 1956
Hattori, 1970
Kawasaki, 1968
Kramer, 1960
Nomura, 1959
Odate, 1961
Okiyama, 1965

General biology
Ahlstrom, 1959
Dekhnik, 1959
Fukataki, 1956
Hattori, 1965
Hattori, 1970
Hayano, 1954
Il'ina, 1951
Kamiya, 1916
Kamiya, 1925
Kawasaki, 1968
Kobayashi, 1960
Kramer, 1960
Kramer, 1969
Kramer and Smith, 1970
Matsuda, 1969
Mito, 1967
Nellen and Hempel, 1970
Ochiai, 1965
Odate, 1961
Okiyama, 1965
Sano and Tamura, 1958
Shirota, 1970
Uchida, 1954
Watanabe, 1970

JUVENILES

Description
Bini, 1968
Jones and Kumaran, 1964
Kishinouye, 1923
Kramer, 1960
Kramer, 1969
Ochiai, 1965
Roedel, 1949
Šoljan, 1948
Šoljan, 1963
Uchida et al., 1958
Watanabe, 1970

Distribution
Dragovich, 1970
Gorbunova, 1965c
Hattori, 1965
Kawasaki, 1968
Kobayashi, 1960
Kramer, 1960
Kramer, 1969
Matsuda, 1969
Ochiai, 1965
Odate, 1961
Uchida, 1954
Watanabe, 1970

Collection method
Kramer, 1960
Odate, 1961
Van Olst and Hunter, 1970

General biology
Dragovich, 1970
Hattori, 1965
Kobayashi, 1960
Kramer, 1960
Kramer, 1969
Matsuda, 1969
Mitchell and Hunter, 1970
Ochiai, 1965
Odate, 1961
Van Olst and Hunter, 1970
Watanabe, 1970

Scomber scombrus

EGGS

Description
Bănărescu, 1964
Bigelow and Schroeder, 1953
Bigelow and Welsh, 1925
Borcea, 1929
Borcea, 1933
Dekhnik, 1959
Demir and Arim, 1957
Ehrenbaum, 1909
Hildebrand and Schroeder, 1928
Kamiya, 1916
Le Gall, 1938
Lissner, 1938
Padoa, 1956
Sella and Ciacchi, 1925
Sette, 1943
Sparks, 1929
Tracy, 1907
Vodianitskii, 1936
Vodianitskii and Kazanova, 1954

Distribution
Bănărescu, 1964
Bigelow and Schroeder, 1953
Bigelow and Welsh, 1925
Corbin, 1947

Demir and Arim, 1957
Devedjian, 1926
Gorbunova, 1965c
Hildebrand and Schroeder, 1928
Kändler, 1952
Kändler, 1954
Sette, 1943
Sparks, 1929
Steven, 1949

COLLECTION METHOD
Corbin, 1947
Sette, 1943
Sparks, 1929

GENERAL BIOLOGY
Borcea, 1929
Corbin, 1947
Kändler, 1952
Kändler, 1954
Sette, 1943
Tracy, 1907

LARVAE

DESCRIPTION
Bănărescu, 1964
Bigelow and Schroeder, 1953
Bigelow and Welsh, 1925
Bini, 1968
Cunningham, 1891a
Cunningham, 1891b
Dekhnik, 1959
Ehrenbaum, 1909
Ehrenbaum, 1923
Ehrenbaum, 1924
Le Gall, 1938
Lissner, 1938
Padoa, 1956
Sella and Ciacchi, 1925
Sette, 1943
Vodianitskii and Kazanova, 1954

DISTRIBUTION
Bigelow and Schroeder, 1953
Bigelow and Welsh, 1925
Clark et al., 1969
Corbin, 1947
Demir and Arim, 1957
Ehrenbaum, 1923
Gorbunova, 1965c
Gorbunova, 1966
Karlovac, 1961
Karlovac, 1962
Müller, 1970
Sette, 1943
Steven, 1949

COLLECTION METHOD
Corbin, 1947
Müller, 1970
Nellen and Hempel, 1970
Sette, 1943

GENERAL BIOLOGY
Corbin, 1947
Demir and Arim, 1957
Kändler, 1961
Karlovac, 1961
Karlovac, 1962
Lebour, 1918
Marr, 1956
Müller, 1970
Nellen and Hempel, 1970
Sette, 1943

JUVENILES

DESCRIPTION
Bănărescu, 1964
Bigelow and Schroeder, 1953
Bigelow and Welsh, 1925
Bini, 1968
Ehrenbaum, 1909
Ehrenbaum, 1923
Le Gall, 1938
Padoa, 1956
Sette, 1943

DISTRIBUTION
Bigelow and Schroeder, 1953
Bigelow and Welsh, 1925
Demir and Arim, 1957
Dragovich, 1970
Ehrenbaum, 1923
Gorbunova, 1965c
Karlovac, 1961
Karlovac, 1962
Nellen and Hempel, 1970
Parsons and Hodder, 1970
Serbétis, 1955
Sette, 1943
Steven, 1948

COLLECTION METHOD
Nellen and Hempel, 1970
Sette, 1943

GENERAL BIOLOGY
Demir and Arim, 1957
Dragovich, 1970
Karlovac, 1961
Karlovac, 1962
Lebour, 1918
Nellen and Hempel, 1970
Sette, 1943
Steven, 1948
Steven, 1949
Steven, 1952

Scomberomorus sp.

EGGS

DESCRIPTION
No references found

DESCRIPTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Peter, 1969b

LARVAE

DESCRIPTION
Gorbunova, 1963

DISTRIBUTION
Gorbunova, 1963
Gorbunova, 1966
Gorbunova and Salabarría, 1967

COLLECTION METHOD
Hattori, 1964

GENERAL BIOLOGY
Peter, 1969b

JUVENILES

DISTRIBUTION
Ehrenbaum, 1924
Klawe, 1961a.

DISTRIBUTION
Klawe, 1961a

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Scomberomorus cavalla

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Wollam, 1970

DISTRIBUTION
Wollam, 1970

COLLECTION METHOD
Wollam, 1970

GENERAL BIOLOGY
Wollam, 1970

JUVENILES

DESCRIPTION
Wollam, 1970

DISTRIBUTION
Wollam, 1970

COLLECTION METHOD
Wollam, 1970

General biology
Wollam, 1970

Scomberomorus chinense

EGGS

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

LARVAE

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

JUVENILES

Description
Kishinouye, 1924

Distribution
No references found

Collection method
No references found

General biology
No references found

Scomberomorus commerson

EGGS

Description
Chacko, 1950
Jones and Kumaran, 1964
Mito, 1960
Mito, 1961
Munro, 1943a

Distribution
Chacko, 1950
Gorbunova, 1965c

Collection method
Chacko, 1950

General biology
No references found

LARVAE

Description
Chacko, 1950
Gorbunova, 1965b
Jones, 1962
Jones and Kumaran, 1964
Mito, 1961
Munro, 1943a

Distribution
Chacko, 1950
Gorbunova, 1965b
Gorbunova, 1965c

Collection method
Chacko, 1950

General biology
No references found

JUVENILES

Description
Jones, 1962
Jones and Kumaran, 1964
Kishinouye, 1923
Smith, 1949
Williams, 1964

DISTRIBUTION
Basheeruddin and Nayar, 1962
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Kumaran, 1964a
Rao, K. S., 1964
Tongyai, 1970

Scomberomorus concolor

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Fitch and Flechsig, 1949
Klawe, 1966

DISTRIBUTION
Fitch and Flechsig, 1949
Klawe, 1966

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Scomberomorus guttatus

EGGS

DESCRIPTION
Delsman, 1931
Mito, 1960
Mito, 1961
Vijayaraghavan, 1955

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Delsman, 1931
Delsman and Hardenburg, 1934
Gorbunova, 1965b
Jones, 1962
Jones and Kumaran, 1964
Mito, 1961
Vijayaraghavan, 1955

DISTRIBUTION
Gorbunova, 1965b
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Herre and Myers, 1937
Jones, 1962
Jones and Kumaran, 1964

Kaikini, 1960
Kishinouye, 1923
Vijayaraghavan, 1955

DISTRIBUTION
Basheeruddin and Nayar, 1962
Gorbunova, 1965c
Herre and Myers, 1937
Kaikini, 1960
Merçeron, 1970

COLLECTION METHOD
Merçeron, 1970

GENERAL BIOLOGY
Kumaran, 1964a
Merçeron, 1964
Rao, K. S., 1964
Venkataraman, 1960
Vijayaraghavan, 1955

Scomberomorus lineolatus

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Jones, 1962

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
Merçeron, 1970

COLLECTION METHOD
Merçeron, 1970

GENERAL BIOLOGY
Kuthalingam, 1959
Merçeron, 1970
Rao, K. S., 1964

Scomberomorus maculatus

EGGS

DESCRIPTION
Earll, 1884
Hildebrand and Schroeder, 1928
Ryder, 1882
Smith, 1907
Tracy, 1907

DISTRIBUTION
Gorbunova, 1965c
Hildebrand and Schroeder, 1928
Smith, 1907
Tracy, 1907

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Earll, 1882
Earll, 1884
Kite, 1885
Klima, 1959
Ryder, 1882
Smiley, 1881
Smith, 1907
Tracy, 1907
Verrill, 1880
Wood, 1885

LARVAE

DESCRIPTION
Hildebrand and Cable, 1938

Ryder, 1882
Wollam, 1970

DISTRIBUTION
Gorbunova, 1965c
Wollam, 1970

COLLECTION METHOD
Wollam, 1970

GENERAL BIOLOGY
Earll, 1882
Earll, 1884
Ryder, 1882
Smiley, 1881
Verrill, 1880
Wollam, 1970

JUVENILES

DESCRIPTION
Hildebrand and Cable, 1938
Wollam, 1970

DISTRIBUTION
Gorbunova, 1965c
Wollam, 1970

COLLECTION METHOD
Wollam, 1970

GENERAL BIOLOGY
Wollam, 1970

Scomberomorus niphonius

EGGS

DESCRIPTION
Kamiya, 1922
Kamiya, 1924
Mito, 1960
Mito, 1961
Mito, 1966
Sha et al., 1966

DISTRIBUTION
Gorbunova, 1965c
Kamiya, 1922
Kamiya, 1924

COLLECTION METHOD
Sha et al., 1966

GENERAL BIOLOGY
Kamiya, 1924
Mito, 1960
Sha et al., 1966

LARVAE

DESCRIPTION
Mito, 1961
Mito, 1966
Sha et al., 1966

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Mito, 1967
Sha et al., 1966

JUVENILES

DESCRIPTION
Kishinouye, 1923
Sha et al., 1966

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Sha et al., 1966

Scomberomorus queenslandicus

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

General biology
No references found

LARVAE

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

JUVENILES

Description
Jones and Silas, 1964
Munro, 1943b

Distribution
No references found

Collection method
No references found

General biology
No references found

Scomberomorus regalis

EGGS

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

LARVAE

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

JUVENILES

Description
Hubbs, 1936

Distribution
Hubbs, 1936

Collection method
No references found

General biology
No references found

Scomberomorus semifasciatus

EGGS

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

LARVAE

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

JUVENILES

DESCRIPTION
Jones and Silas, 1964
Munro, 1943b

DISTRIBUTION
Munro, 1943b

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Munro, 1943b

Scomberomorus sierra

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Klawe, 1966
Matsumoto, 1968

DISTRIBUTION
Klawe, 1966

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Clemens, 1956
Eckles, 1949
Fitch and Flechsig, 1949
Klawe, 1966
Matsubara, 1955
Matsumoto, 1968
Mead, 1951

DISTRIBUTION
Eckles, 1949
Fitch and Flechsig, 1949
Klawe, 1966
Mead, 1951

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Clemens, 1956
Herald, 1951

Scomberomorus sinensis

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

JUVENILES

DESCRIPTION
Blanc et al., 1965

D'Aubenton and Blanc, 1965

DISTRIBUTION
D'Aubenton and Blanc, 1965

COLLECTION METHOD
No references found

GENERAL BIOLOGY
D'Aubenton and Blanc, 1965

Scomberomorus tritor

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
Zharov and Zhudova, 1967
Zhudova, 1969a

DISTRIBUTION
Conand, 1970
Zharov and Zhudova, 1967
Zhudova, 1969a

COLLECTION METHOD
Conand, 1970

GENERAL BIOLOGY
Conand, 1970
Zhudova, 1969a

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

Scombridae

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
Matsumoto et al., 1966
Matsumoto et al., 1969
Ueyanagi and Ahlstrom, 1963

GENERAL BIOLOGY
Kunitsyn, 1968
Matsumoto et al., 1969
Peter, 1969b

LARVAE

DESCRIPTION
Matsumoto et al., 1969

DISTRIBUTION
Clark et al., 1969
Fisheries Agency, Japan, 1964

COLLECTION METHOD
Fisheries Agency, Japan, 1963
Fisheries Agency, Japan, 1964
Fisheries Agency, Japan, 1968
Fisheries Agency, Japan, 1969
Matsumoto et al., 1966
Matsumoto et al., 1969
Ueyanagi and Ahlstrom, 1963
Ueyanagi et al., 1963

GENERAL BIOLOGY
Fisheries Agency, Japan, 1966
Kunitsyn, 1968
Matsumoto et al., 1969
Peter, 1969b

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
Ashmole and Ashmole, 1967
Ashmole and Ashmole, 1968
Basheeruddin and Nayar, 1962
Dragovich, 1970
Weeks, 1970

COLLECTION METHOD
Matsumoto et al., 1966
Matsumoto et al., 1969

GENERAL BIOLOGY
Dragovich, 1970

Thunnidae

EGGS

DESCRIPTION
Nakamura, 1959

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
Peter, 1969b

LARVAE

DESCRIPTION
Aboussouan, 1969
Wickstead, 1965

DISTRIBUTION
Aboussouan, 1965
Aboussouan, 1969
Blackburn, 1965
Dekhnik et al., 1966
Fisheries Agency, Japan, 1963
Fursa, 1969
Sette et al., 1954
Ueyanagi, 1967b
Wade, 1951

COLLECTION METHOD
Aboussouan, 1965
Fisheries Agency, Japan, 1963
Nellen and Hempel, 1970
Sette et al., 1954
Ueyanagi, 1965
Ueyanagi, 1967b

GENERAL BIOLOGY
Aboussouan, 1965
Blackburn, 1965
Mito, 1967
Nakamura, 1959
Peter, 1969b
Ueyanagi, 1966b
Ueyanagi, 1967b

JUVENILES

DESCRIPTION
No references found

DISTRIBUTION
Scaccini, 1959
Scaccini, 1967a
Ueyanagi, 1967b
Watanabe, 1958

COLLECTION METHOD
Mori, 1969
Ueyanagi, 1967b
Yabuta, 1953

GENERAL BIOLOGY
Scaccini, 1959
Scaccini, 1961a
Ueyanagi, 1966b
Ueyanagi, 1967b
Yabuta, 1953

Thunnus sp.

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

General biology
No references found

LARVAE

Description
Gorbunova, 1963
Klawe, 1961a
Klawe and Shimada, 1959
Sun', 1960
Ueyanagi and Ahlstrom, 1963
Yabe and Ueyanagi, 1962a
Yabe and Ueyanagi, 1962b
Zhudova, 1969b

Distribution
Barthélémy-Lefèvre, 1955
Gorbunova, 1963
Jones and Kumaran, 1963
Klawe, 1960a
Klawe, 1961a
Klawe and Shimada, 1959
Mori, 1970
Sun', 1960
Yabe and Ueyanagi, 1962a
Yabe and Ueyanagi, 1962b
Zhudova, 1969b

Collection method
No references found

General biology
No references found

JUVENILES

Description
Fowler, 1944
Kagoshima Prefectural Fisheries Station, 1926
Kagoshima Prefectural Fisheries Station, 1927
Kishinouye, 1926
Klawe, 1961a
Klawe and Shimada, 1959

Distribution
Dragovich, 1970
Fowler, 1944
Klawe, 1961a
Klawe and Shimada, 1959
Parin, 1967b

Collection method
No references found

General biology
Dragovich, 1970

Thunnus alalunga

EGGS

Description
Belloc, 1954
Le Gall, 1949
Padoa, 1956
Parona, 1919
Sanzo, 1909a
Sanzo, 1925
Sanzo, 1933
Yoshida and Otsu, 1963

Distribution
Gorbunova, 1965c
Postel, 1963b

Collection method
No references found

General biology
Sanzo, 1909a

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Description
Belloc, 1954
Bini, 1968
Ehrenbaum, 1924
Gorbunova, 1963
Jones and Kumaran, 1964
Kazanova, 1962
Le Gall, 1949
Lütken, 1880
Lütken, 1881
Matsumoto, 1962
Matsumoto, 1966b
Nankai Regional Fisheries Research Laboratory, 1967
Padoa, 1956
Sanzo, 1909a
Sanzo, 1925
Sanzo, 1933
Scaccini, 1967b
Scaccini, 1968

Sella, 1924
Ueyanagi, 1966a
Ueyanagi, 1969b
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Ueyanagi et al., 1963
Ueyanagi et al., 1969a
Yabe et al., 1963
Yoshida and Otsu, 1963
Zharov and Zhudova, 1967
Zhudova, 1969a

DISTRIBUTION
Far Seas Fisheries Research Laboratory, 1969
Fisheries Agency, Japan, 1964
Fisheries Agency, Japan, 1966
Fisheries Agency, Japan, 1970b
Gorbunova, 1963
Gorbunova, 1965a
Gorbunova, 1965c
Gorbunova, 1966
Gorbunova and Salabarría, 1967
Hayasi et al., 1970
Kazanova, 1962
Le Danois, 1951
Lütken, 1880
Matsumoto, 1962
Matsumoto, 1966a
Nakamura and Matsumoto, 1966
Parin, 1968
Postel, 1963b
Richards, 1967
Richards, 1969a
Schaefer, 1948
Ueyanagi, 1967a
Ueyanagi, 1967b
Ueyanagi, 1968b
Ueyanagi, 1969b
Ueyanagi, 1969c
Ueyanagi et al., 1969a
Yoshida and Otsu, 1963
Zharov and Zhudova, 1967
Zhudova, 1969a

COLLECTION METHOD
Fisheries Agency, Japan, 1964
Fisheries Agency, Japan, 1966
Fisheries Agency, Japan, 1970b
Nakamura and Matsumoto, 1966
Richards, 1969a
Sella, 1924
Ueyanagi, 1967b

GENERAL BIOLOGY
Fisheries Agency, Japan, 1964
Hayasi et al., 1970
Matsumoto, 1966a
Sanzo, 1909a
Ueyanagi, 1967b
Ueyanagi, 1968b
Ueyanagi, 1969c
Zhudova, 1969a

JUVENILES

DESCRIPTION
Asano, 1964
Jones and Silas, 1960
Kishinouye, 1923
Lütken, 1881
Matsumoto, 1963
Padoa, 1956
Postel, 1962
Postel, 1964
Sella, 1924
Ueyanagi and Watanabe, 1962
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Yoshida, 1965

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Asano, 1964
Ashmole and Ashmole, 1967
Demir, M., 1961
Fisheries Agency, Japan, 1966
Gorbunova, 1965c
Hayasi et al., 1970
Higgins, 1967
Higgins, 1970
Le Danois, 1951
Nakamura, 1959
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Schaefer, 1948
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Ueyanagi and Watanabe, 1962
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Yoshida, 1968

COLLECTION METHOD
Fisheries Agency, Japan, 1966
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Ueyanagi, 1967b

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Asano, 1964
Demir, M., 1961
Hayasi et al., 1970
Higgins, 1970
Kishinouye, 1917
Ueyanagi, 1967b
Yoshida, 1968
Yoshida and Otsu, 1963

Thunnus albacares

EGGS

DESCRIPTION
Anonymous, 1970a
Anonymous, 1970b
Fisheries Agency, Japan, 1970a

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
Anonymous, 1970a
Anonymous, 1970b

GENERAL BIOLOGY
Fisheries Agency, Japan, 1970a

LARVAE

DESCRIPTION
Anonymous, 1970a
Anonymous, 1970b
Bellón, 1954b
Fisheries Agency, Japan, 1970a
Gorbunova, 1963
Jones, 1960a
Jones and Kumaran, 1964
Kazanova, 1962
Marchal, 1963a
Marchal, 1963b
Matsubara, 1955
Matsumoto, 1958
Matsumoto, 1966b
Mead, 1951
Mimura et al., 1963a
Nakamura, 1959
Nankai Regional Fisheries Laboratory, 1967
Ochiai, 1965
Schaefer et al., 1963
Shirota, 1970
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Ueyanagi, 1966a
Ueyanagi, 1969b
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Wade, 1950
Wade, 1951
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DISTRIBUTION
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Hayasi et al., 1970
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Kazanova, 1962
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Marchal, 1963a
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Ochiai, 1965
Parin, 1968
Richards, 1967
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Rothschild, 1963
Schaefer, 1948
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Schaefer et al., 1963
Sette et al., 1954
Strasburg, 1960
Sun', 1960
Ueyanagi, 1966b
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Ueyanagi, 1968b
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Ueyanagi et al., 1969b
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Wade, 1951
Yabe and Ueyanagi, 1962a
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Yabe, 1954
Yamanaka, 1966
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COLLECTION METHOD
Anonymous, 1970a
Anonymous, 1970b
Conand, 1970
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Anonymous, 1970a
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Matsumoto, 1960
Matsumoto, 1966a
Mori, 1970
Ochiai, 1965
Schaefer, 1961
Shirota, 1970
Strasburg, 1959
Ueyanagi, 1967b
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DESCRIPTION
Anonymous, 1970a
Anonymous, 1970b
Bellón, 1954b
Greenhood, 1952
Jones and Kumaran, 1964
Jones and Silas, 1960
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Kishinouye, 1926
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Marchal, 1963a
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Matsubara, 1955
Matsumoto, 1961
Mead, 1951
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Ochiai, 1965
Postel, 1962

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Rossignol and Repelin, 1962
Schaefer and Marr, 1948a
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Ueyanagi and Watanabe, 1962
Wade, 1950
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Watson and Mather, 1961
Yabe et al., 1958

DISTRIBUTION
Anonymous, 1970a
Anonymous, 1970b
Ashmole and Ashmole, 1967
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Bellón, 1954b
Bini, 1952
Clemens, 1955
Fisheries Agency, Japan, 1966
Gorbunova, 1965c
Hayasi et al., 1970
Higgins, 1967
Higgins, 1970
Idyll and de Sylva, 1963c
Klawe, 1963
Klawe and Shimada, 1959
Marchal, 1963a
Matsumoto, 1961
Mead, 1951
Mimura et al., 1963a
Nakamura, 1959
Nakamura, 1965
Ochiai, 1965
Parin, 1968
Schaefer, 1948
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Ueyanagi and Watanabe, 1962
Wade, 1950
Wade, 1951
Yabe et al., 1958
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Yamanaka, 1966

COLLECTION METHOD
Anonymous, 1970a
Anonymous, 1970b
Clemens, 1955
Fisheries Agency, Japan, 1966
Hayasi et al., 1970
Inoue et al., 1967
Nakamura, 1959
Schaefer and Marr, 1948a
Ueyanagi, 1965
Ueyanagi, 1967b
Yabe et al., 1953
Yabe et al., 1958

GENERAL BIOLOGY
Anonymous, 1970a
Anonymous, 1970b
Bini, 1952
Hayasi et al., 1970
Higgins, 1970
Inoue et al., 1967
Mimura et al., 1963a
Nakamura, 1965
Ueyanagi, 1965
Ueyanagi, 1967b
Yabe et al., 1953
Yamanaka, 1966

Thunnus atlanticus

EGGS

DESCRIPTION
No references found

DISTRIBUTION
No references found

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

LARVAE

DESCRIPTION
No references found

DISTRIBUTION
Gorbunova and Salabarría, 1967

COLLECTION METHOD
No references found

General biology
No references found

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Description
Idyll and de Sylva, 1963b
Klawe, 1961a
Klawe and Shimada, 1959
Nakamura and Kikawa, 1966
Potthoff and Richards, 1970
Watson, 1962
Watson and Mather, 1961

Distribution
Dragovich, 1970
Idyll and de Sylva, 1963b
Klawe, 1961a
Klawe and Shimada, 1959
Potthoff and Richards, 1970

Collection method
Potthoff and Richards, 1970

General biology
Dragovich, 1970
Potthoff and Richards, 1970

Thunnus maccoyii

EGGS

Description
No references found

Distribution
No references found

Collection method
No references found

General biology
No references found

LARVAE

Description
Nankai Regional Fisheries Research Laboratory, 1967
Ueyanagi, 1969a
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Distribution
Chiomi, 1970
Far Seas Fisheries Research Laboratory, 1969
Nankai Regional Fisheries Research Laboratory, 1967
Ueyanagi, 1966b
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Ueyanagi, 1969b
Ueyanagi et al., 1969a
Yabe et al., 1966

Collection method
No references found

General biology
Ueyanagi, 1969a

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Description
Nakamura and Kikawa, 1966
Yabe et al., 1966

Distribution
Chiomi, 1970
Robins, 1963
Ueyanagi, 1966b
Yabe et al., 1966

Collection method
No references found

General biology
Robins, 1963

Thunnus obesus

EGGS

Description
Anonymous, 1970a
Anonymous, 1970b
Kume, 1962
Mimura et al., 1963b
Mito, 1961

DISTRIBUTION
Anonymous, 1970a
Anonymous, 1970b
Gorbunova, 1965c
Mimura et al., 1963b

COLLECTION METHOD
Anonymous, 1970a
Anonymous, 1970b

GENERAL BIOLOGY
Alverson and Peterson, 1963
Anonymous, 1970a
Anonymous, 1970b
Kume, 1962
Mimura et al., 1963b
Nakamura and Hiyama, 1957

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DESCRIPTION
Alverson and Peterson, 1963
Anonymous, 1970a
Anonymous, 1970b
Gorbunova, 1963
Gorbunova, 1965b
Jones and Kumaran, 1964
Kume, 1962
Matsumoto, 1962
Matsumoto, 1966b
Mimura et al., 1963b
Mito, 1961
Nankai Regional Fisheries Research Laboratory, 1967
Ueyanagi, 1966a
Ueyanagi, 1969b
Ueyanagi and Watanabe, 1964
Ueyanagi et al., 1963
Ueyanagi et al., 1969a
Yabe et al., 1963
Zharov and Zhudova, 1967
Zhudova, 1969a
Zhudova, 1969b

DISTRIBUTION
Alverson and Peterson, 1963
Anonymous, 1970a
Anonymous, 1970b
Barthélémy-Lefèvre, 1955
Far Seas Fisheries Research Laboratory, 1969
Fisheries Agency, Japan, 1970b
Fursa, 1969
Gorbunova, 1963
Gorbunova, 1965a
Gorbunova, 1965b
Gorbunova, 1965c
Gorbunova, 1966
Gorbunova and Salabarría, 1967
Hayasi et al., 1970
Matsumoto, 1962
Matsumoto, 1966a
Mimura et al., 1963b
Mori, 1970
Nakamura and Matsumoto, 1966
Parin, 1968
Richards, 1967
Richards, 1969a
Richards, 1969b
Richards et al., 1969a
Richards et al., 1969b
Richards et al., 1970
Ueyanagi, 1967a
Ueyanagi, 1967b
Ueyanagi, 1968b
Ueyanagi, 1969b
Ueyanagi, 1969c
Ueyanagi et al., 1969a
Ueyanagi et al., 1969b
Zharov and Zhudova, 1967
Zhudova, 1969a
Zhudova, 1969b

COLLECTION METHOD
Fisheries Agency, Japan, 1970b
Nakamura and Matsumoto, 1966
Richards, 1969a
Ueyanagi, 1967b
Ueyanagi et al., 1969b

GENERAL BIOLOGY
Anonymous, 1970a
Anonymous, 1970b
Hayasi et al., 1970
Kume, 1962
Matsumoto, 1966a
Ueyanagi, 1968b
Ueyanagi, 1969c
Zhudova, 1969a

JUVENILES

DESCRIPTION
Jones and Silas, 1960

Mimura et al., 1963b
Nakamura and Kikawa, 1966
Postel, 1962
Postel, 1964
Rossignol and Repelin, 1962
Ueyanagi and Watanabe, 1962
Yabe et al., 1958

DISTRIBUTION
Alverson and Peterson, 1963
Gorbunova, 1965c
Hayasi et al., 1970
Higgins, 1967
Higgins, 1970
Mimura et al., 1963b
Nakamura, 1959
Ueyanagi, 1967b
Ueyanagi and Watanabe, 1962
Yabe et al., 1958
Yabe et al., 1963

COLLECTION METHOD
Anonymous, 1941
Nakamura, 1959
Ueyanagi, 1965
Ueyanagi, 1967b
Yabe et al., 1958

GENERAL BIOLOGY
Hayasi et al., 1970
Higgins, 1970
Kishinouye, 1917
Marukawa, 1939
Mimura et al., 1963b
Ueyanagi, 1965

Thunnus thynnus

EGGS

DESCRIPTION
Altan, 1957b
Anonymous, 1970a
Anonymous, 1970b
Bănărescu, 1964
Bellón, 1954a
Bigelow and Schroeder, 1953
Heldt, 1926
Heldt, 1934
Mito, 1961
Oven, 1959
Padoa, 1956
Parona, 1919
Sanzo, 1909a
Sanzo, 1910
Sanzo, 1929
Sanzo, 1932b
Tiews, 1963
Vodianitskii, 1936
Vodianitskii and Kazanova, 1954
Yamanaka et al., 1963

DISTRIBUTION
Akyüz and Artüz, 1957
Bigelow and Schroeder, 1953
Devedjian, 1926
Gorbunova, 1965c
Parona, 1919
Rivas, 1954
Tiews, 1963

COLLECTION METHOD
Anonymous, 1970a
Anonymous, 1970b

GENERAL BIOLOGY
Bellón, 1954a
De Buen, 1935
Oven, 1959
Rivas, 1954
Sanzo, 1909a

LARVAE

DESCRIPTION
Altan, 1957b
Anonymous, 1970a
Anonymous, 1970b
Bănărescu, 1964
Bellón, 1954a
Bini, 1968
Dieuzeide, 1951
Ehrenbaum, 1924
Gorbunova, 1965b
Heldt, 1926
Heldt, 1934
Jones and Kumaran, 1964
Kazanova, 1962
Matsumoto, 1962
Matsumoto, 1966b
Mito, 1961
Nakamura, 1959
Nankai Regional Fisheries Research Laboratory, 1967

Ochiai, 1965
Oven, 1959
Padoa, 1956
Parona, 1919
Postel, 1964
Sanzo, 1909a
Sanzo, 1929
Sanzo, 1932b
Scaccini, 1967b
Scaccini, 1968
Sella, 1924
Shirota, 1970
Tiews, 1963
Ueyanagi, 1966a
Ueyanagi and Watanabe, 1964
Ueyanagi et al., 1969a
Vodianitskii, 1936
Vodianitskii and Kazanova, 1954
Yabe and Ueyanagi, 1962a
Yabe and Ueyanagi, 1962b
Yabe et al., 1963
Yabe et al., 1966
Yamanaka et al., 1963

DISTRIBUTION
Akyüz and Artüz, 1957
Anonymous, 1970a
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Bellón, 1954a
Bigelow and Schroeder, 1953
Dieuzeide, 1951
Far Seas Fisheries Research Laboratory, 1969
Gorbunova, 1965b
Gorbunova, 1965c
Gorbunova, 1966
Gorbunova and Salabarría, 1967
Hattori, 1965
Kazanova, 1962
Masuda, 1963
Matsumoto, 1962
Matsumoto, 1966a
Mori, 1970
Nakamura, 1959
Postel, 1962
Richards, 1967
Richards, 1969a
Richards et al., 1969a
Richards et al., 1970
Rivas, 1954
Tiews, 1963
Ueyanagi, 1966b
Ueyanagi, 1967a
Ueyanagi, 1969b
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Yabe, 1954
Yabe and Ueyanagi, 1962a
Yabe and Ueyanagi, 1962b
Yabe et al., 1963
Yabe et al., 1966
Yamanaka et al., 1963

COLLECTION METHOD
Nakamura, 1959
Richards, 1969a
Sella, 1924

GENERAL BIOLOGY
Anonymous, 1970a
Anonymous, 1970b
Bellón, 1954a
Masuda, 1963
Matsumoto, 1966a
Ochiai, 1965
Oven, 1959
Rivas, 1954
Sanzo, 1909a
Shirota, 1970
Tracy, 1907
Ueyanagi, 1969b
Yabe et al., 1966

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DESCRIPTION
Anonymous, 1970a
Anonymous, 1970b
Bellón, 1954a
Bini, 1968
De Buen, 1932
Dieuzeide and Roland, 1955
Fowler, 1944
Heldt, 1926
Heldt, 1932a
Heldt, 1932b
Jones and Silas, 1960
Kishinouye, 1919
Kishinouye, 1923
Klawe, 1959
Nakamura and Kikawa, 1966
Padoa, 1956
Parona, 1919
Potthoff and Richards, 1970
Sanzo, 1910

Scaccini, 1961b
Sella, 1924
Tiews, 1963
Ueyanagi and Watanabe, 1962
Watson, 1964
Watson and Mather, 1961
Yabe et al., 1966

DISTRIBUTION
Anonymous, 1970a
Anonymous, 1970b
Bigelow and Schroeder, 1953
Dieuzeide and Roland, 1955
Fowler, 1944
Furnestin et al., 1958
Gorbunova, 1965c
Heldt, 1928
Heldt, 1930
Heldt, 1932b
Parona, 1919
Potthoff and Richards, 1970
Rivas, 1954
Sarà, 1967a
Sarà, 1967b
Scaccini, 1961c
Scaccini, 1961d
Tiews, 1963
Ueyanagi, 1966b
Yabe et al., 1966
Yamanaka et al., 1963

COLLECTION METHOD
Fisheries Agency, Japan, 1970a
Inoue et al., 1967
Potthoff and Richards, 1970
Sella, 1924
Yabe et al., 1953

GENERAL BIOLOGY
Anonymous, 1970a
Anonymous, 1970b
Fisheries Agency, Japan, 1970a
Furnestin and Dardignac, 1962
Inoue et al., 1967
Inoue et al., 1970
Potthoff and Richards, 1970
Rivas, 1954
Scaccini, 1961d
Tiews, 1963
Yabe et al., 1953
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Thunnus tonggol

EGGS

DESCRIPTION
No references found

DISTRIBUTION
Gorbunova, 1965c

COLLECTION METHOD
No references found

GENERAL BIOLOGY
No references found

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DESCRIPTION
Jones and Kumaran, 1964
Matsumoto, 1962
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Richards, 1969a
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No references found

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No references found

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DESCRIPTION
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